2. Taxonomic Studies Of Nagarparkar Flora

2.1. Introduction

The proper utilization of plant wealth of an area on sustainable basis depends upon the correct identification and naming of all the taxa present in the area. Correct name is the key to the literature (Vanstenis, 1951). Nagarparkar is a remote area and there are no previous reports on the flora of this region with the exception of Chaudhri & Chuttar (1966) which deals with the vegetation and the flora of entire Tharparkar desert including Nagarparkar. This study is almost half a century old. Stewart (1982) dealt the history of plant collection of Pakistan in detail. Griffith (1839, 1847, 1848) seems to be the first botanist who collected in Sindh but he botanized only the upper part of Sindh while on his way to Afghanistan. He was followed by Vicary(1847) and Stocks (1848-1852) but none of them collected thoroughly and never reached to Nagarparkar. Boissier (1867-84) and Hooker (1872- 97) also included Stocks collection from Sindh in their "Flora Orientalis" and "Flora of British India" respectively. Later on some regional floras including Sindh have been written from time to time such as Cooke (1904-09) "Flora of Bombay Presidency" ,McCann & Sabnis (1927-29) "Flora of Indus Delta", Hasnain & Rahman (1957), "Plants of Sind and Karachi", but all of them ignored Nagarparkar. The recent publication of flora of Pakistan(1971-continued) which covers the entire Pakistan also includes Tharparkar and Nagarparkar but there is no exclusive and detailed treatment of flora of Nagarparkar. Therefore in order to fill the gap the present work was undertaken.

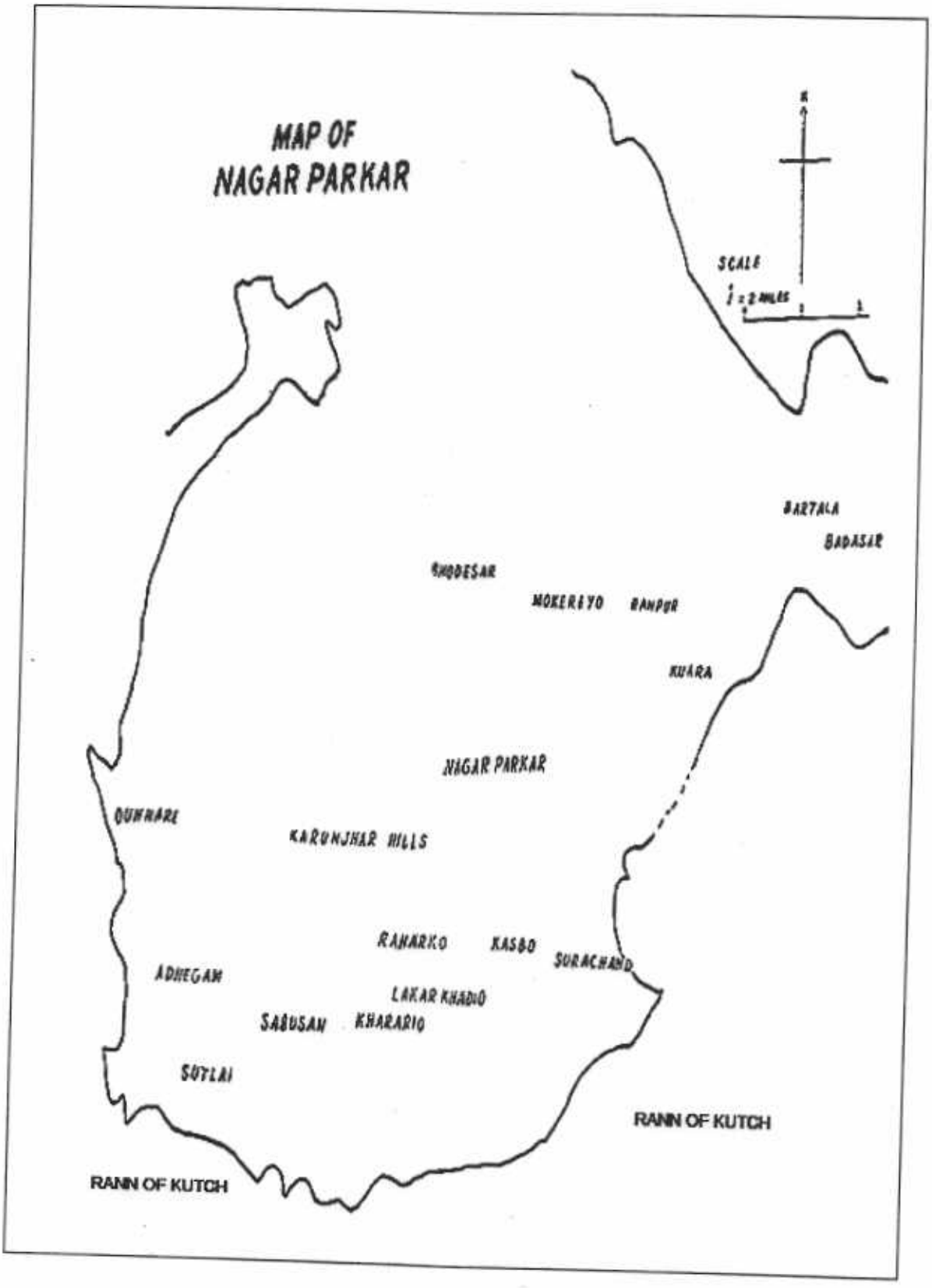
2.2. Materials and Methods

Plants were collected from Nagarparker between the years 2002-2005. The area was visited twice a year during the monsoon period and winter. An itinerary is given in Table-5. All the specimens are deposited in the Karachi University Herbarium (KUH). Centre of Plant Conservation. The specimens were identified with the help of different Floras but mainly Flora of Pakistan. Boissier's Flora Orientalis (1875-1898); Hooker's Flora of British India (1872-1897); Cooke's Flora of Bombay presidency (1904-9) ; Chaudhri & Chuttar's Flora of Thar desert (1966) and Flora of Karachi by Jafri (1966) were also consulted. In addition to this recent literature including monographs and taxonomic revisions were also used for verification of nomenclature including Jarvis (2007).

Key to the families, genera and key to the species with their description are provided in the present work. In addition to these, representative specimens, ecological notes, flowering periods, distribution and taxonomic notes wherever necessary are given.

Table -5: Itinerary of Collection Trip of Nagarparkar.

S.No.	Months	Period of stay (days)	Departure date	Arrival date
1	October	6	19-11-02	24-11-02
2	March	10	11-3-03	20-3-03
3	September	13	14-9-03	26-9-03
4	September	10	14-9-04	23-9-04
5	March	10	21-3-05	30-3-05
6	September	13	14-9-05	26-9-05



Map 2: Main collection localities

2.3. KEY TO THE DICOT FAMILIES

1+	Plants parasitic.....2
-	Plants not parasitic.....4
2+	Stem yellow, thin, climber. Flowers minute, actinomorphic. .....Cuscutaceae
-	Stem not yellow, stout.Flowers large, showy zygomorphic.....3
3+	Ovary 2-celled. Fruit usually septicidal capsule.....Scrophulariaceae
-	Ovary 1-celled. Fruit loculicidal capsule..... .....Orobanchaceae
4+	Plants aquatic.....5
-	Plants terrestrial.....6
5+	Stamens equal or double the number of petals, alternate, free.Ovary 3-5 celled..... .....Elatinaceae
-	Stamens usually unequal the number of petals, didynamous. Ovary 2-celled..... .....Scrophulariaceae
6+	Inflorescence a capitulum. Stamens usually syngenesious..... .....Asteraceae
-	Infloresence not a capitulum. Stamens not syngenesious.....7
7+	Petals absent.....8
-	Petals present..... 16
8+	Petaloid staminode present..... .....Aizoaceae
-	Petaloid staminode absent.....9
9+	Flowers unisexual.Plant monoecious or plant polygamodiecious (having unisexual and bisexual flowers).....10
-	Flowers bisexual only.....12
10+	Flowers unisexual.Infloresence a cymose or cythium. Ovary 3-celled..... .....Euphorbiaceae
-	Plants polygamous. Inflorescence a spike or panicle. Ovary 1-celled.....11
11+	Plants generally fleshy of saline habitat.Bracts not scarious. Filaments free.....Chenopodiaceae
-	Plants apparently not fleshy.Bracts and perianth segments scarious.Filaments usually connate below..... Amaranthaceae
12+	Stipules ochreate..... .....Polygonaceae
-	Stipuls absent, if present then never ocherate.....13
13+	Dichotomously branched herbs with swollen nodes. Fruit an achene..... .....Nyctaginaceae
-	Plants not dichotomously branched, swollen nodes absent. Fruit not an achene..... 14
14+	Flowers in cyme or in panicle. Stamens in 2-series, inflexed in the bud..... .....Lythraceae
-	Flowers solitary or in cyme. Stamens nither in 2-series nor inflexed in the bud..... 15
15+	Flowers in cyme.Stamens double or more than double the number of sepals..... .....Tiliaceae
-	Flowers solitary or in cyme. Stamens equaling or fewer than the

	sepals.....Molugoginaceae
16+	Flowers unisexual or unisexual and bisexual both on the same plant.....17
-	Flowers bisexual.....21
17+	Monoecious annuals or perennials herbs usually with tendrials..... Cucurbitaceae
-	Polygamous, trees or shrubs.....18
18+	Leaves scale like, alternate. Fruit a capsule. Seed comose .....Tamaricaceae
-	Leaves well developed, opposite or alternate. Fruit a drupe. Seed not comose.....19
19+	Shrubs with resin ducts. Leaves compound. Flowers solitary or in panicle.....Burseraceae
-	Shrubs without resin ducts. Leaves simple. Flowers in cyme or in panicle..... 20
20+	Leaves stipulate. Flowers in cyme. Sepals inserted on a disc..... Celastraceae
-	Leaves exstipulate. Flowers in terminal clusters. Sepals not inserted on a disc.....Salvadoraceae
21+	Ovary 1-celled.....22
-	Ovary 2-many celled.....28
22+	Leaves usually compound. Fruit a legume or a pod... .....Leguminosae
-	Leaves usually simple. Fruit not a legume.....23
23+	Flowers actinomorphic.....24
-	Flowers zygomorphic.....26
24+	Sepals 2 usually decidous..... .....Portulacaceae
-	Sepals more than 2, persistent.....25
25+	Sepals and petals equal in number. Placentation parietal..... .....Gentianaceae
-	Sepals and petals unequal in number. Placentation free central or basal.....Caryophylaceae
26+	Leaves basal or cauline. Sepals 2, bract like. Stamens 6, diadelphous..... .....Fumaricaceae
-	Basal or cauline leaves absent. Sepals more than 2, not bract like. Stamens 4-many, free..... 27
27+	Herbs or shrubs. Sepals 4. Ovary on gynophore or androgynophore. Leaves simple or compound.....Capparaceae
-	Plant usually trees. Sepals 5. Gynophore or androgynophore absent. Leaves 2-3 pinnately compound..... .....Moringaceae
28+	Annuals or perennials, underground parts with rhizomes or tuber.....29
-	Trees or shrubs..... 30
29+	Leaves simple.Stamens equal the number of petals..... .....Primulaceae
-	Leaves 3-foliolate. Stamens double the number of petals.... .....Oxalidaceae
30+	Staminal tube present.....31

-	Staminal tube absent.....33
31+	Leaves pinnately compound, exstipulate..... .....Meliaceae
-	Leaves simple, stipulate.....32
32+	Staminal tube apically adnate to the stigma (gynostegium). Fruit 2-folicle. Leaves simple, opposite..... .....Asclepiadeaceae
-	Staminal tube free. Fruit a dry capsule or schizocarp or rarely baccate. Leaves simple, alternate..... .....Malvaceae
33+	Corolla cruciform.Stamens tetradynamous. Fruit a siliqua..... Brassicaceae
-	Corolla not cruciform niether stamens tetradynamous nor fruit a siliqua.....34
34+	Leaves stipulate.....35
-	Leaves exstipulate.....39
35+	Ovary inferior.....36
-	Ovary superior.....37
36+	Leaves simple, opposite or whorld with intrapetiolar stipules..... .....Rubiaceae
-	Leaves simple, alternate, intrapetiolar stipules absent..... .....Rhamnaceae
37+	Trees. Stipules modified into spines. Ovary free from the disc. Stamens equal to the petals..... .....Rhamnaceae
-	Usually herbs or shrubs rarely trees. Stipules not modified into spines. Ovary not free on the disc. Stamens double or more than double the number of petals.....38
38+	Leaves simple, alternate. Flowers in cyme.Calyx valvate.....Tiliaceae
-	Leaves 2-3 foliate. Flowers solitary or in cyme. Calyx imbricate..... Zygophylaceae
39+	Plants usually aromatic. Inflorescence usually verticillaster. Leaves opposite. Flowers zygomorphic..... .....Lamiaceae
-	Plants with different set of characters.....40
40+	Stamens inflexed in the bud..... .....Lythraceae
-	Stamens never inflexed in the bud.....41
41+	Staminode present.....42
-	Staminode absent.....43
42+	Annual-perennial herbs. Leaves simple, opposite..... Pedaliaceae
-	Usually trees. Leaves simple, opposite, dessucate or pinnately compound.....Bignoniaceae
43+	Herbs or shrubs. Seed wingless.....44
-	Trees. Seed with wings..... .....Bignoniaceae
44+	Stamens equal to the number of petals.....46
-	Stamens unequal to the number of petals.....45
45+	Inflorescence racemose or cymose. Flowers small, bract and bracteole not prominent. Anthers free..... Scrophulariaceae
-	Inflorescence dichasial cyme. Floweres large. Bract and bracteole prominent. Anther connivent at least in pair..... .....Acanthaceae
46+	Fruit nutlet or a drupe.....47
-	Fruit a capsule.....48

47+	Sepals and petals connate, all stamens not fertile. Fruit a drupe.....Verbenaceae
-	Sepals and petals free. All stamens fertile. Fruit a nutlet or drupe.....Boraginaceae
48+	Flowers usually ebracteate. Anthers dehiscing by pore or longitudinally dehiscing connivent or free. Fruit many seeded..... .....Solanaceae
-	Flowers usually bracteate. Anther dehiscing longitudinally. Fruit few seeded.....Convolvulaceae

2.3.1. ACANTHACEAE

Herbs or shrubs with opposite, decussate, simple leaves. Flowers in cymes; zygomorphic. Sepals 4-5, connate. Corolla 1-2-lipped; petals 5, connate. Stamens 2-4, epipetalous, if 4, didynamous. Carpels 2, syncarpous; ovary superior, 2-celled, each cell 2-many ovuled. Fruit usually a loculicidal capsule.

A family consisting of c. 230 genera and c. 3500 species distributed largely in tropical parts.

KEY TO THE GENERA

1+	Corolla 1- lipped..... ..... *Blepharis*
-	Corolla 2-lipped or equally or subequally 5-lobed 2
2+	Corolla equally or subequally 5-lobed.....3
-	Corolla 2- lipped.....4
3+	Sepals 5. Ovules 2 or more in each cell.....*Ruellia*
-	Sepals 4. Ovules 2 or 1 in each cell..... .....*Barleria*
4+	Stamens 4, didynamous..... .....*Lepidagathis*
-	Stamens 2.....5
5+	Flowers enclosed between two opposite bracts..... .....*Peristrophe*
-	Flowers not enclosed by the bracts, exposed..... .....*Justicia*

BARLERIA

L., Sp. Pl. 636. 175; Gen. Pl. 5. 283. 1754; Malik & Ghafoor in E.Nasir & Ali, Fl. Pak. 188: 45. 1988.

Herbs or shrubs with or without spines. Leaves petiolate or sessile . Flowers in axillary or in terminal spikes. Calyx deeply 4-lobed. Corolla subequally 5-lobed. Stamens 2, staminodes usually 2(-3). Capsule 2 or 4 seeded. Seeds usually hygroscopic, hairy.

A genus of c. 150 species mainly found in tropical parts of Asia and Africa.

KEY TO THE SPECIES

1+	Spines in leaf axil upto 6 mm long.Flowers white.... ..... *B. acanthoides*
-	Spines in leaf axil c. 18 mm long.Flowers yellow..... *B. prionitis*

Barleria acanthoides Vahl, Symb. Bot. 1: 47. 1790; Chaudhri & Chuttar, Veg. Rang. Fl. Thar Desert, 38. 1966; Malik & Ghafoor, l. c. 45. f. 8. E-F.

Fig. 11: *Barleria acanthoides* growing on acidic rock in Nagarparkar.

Much branched, undershrub, densely pubescent. Leaves oblong-ovate, or ± obovate, 12-50 x 8-20 mm. Flowers 2-8, congested, scorpioid racemes; white, large. Bracts elliptic, leafy,often reduced to pinnatifid spines. Outer calyx lobes broadly ovate, 1-1.7 x 0.8-1.0 cm, mucronate, yellowish-brown; inner lobes lanceolate, 7-8 mm long. Corolla tube upto 8 mm long; white, ovate. Capsule ellipsoid, glabrous, 4-seeded. Seeds ovoid.

Specimen studied: Nagarparkar, 24.10.70, *Qaiser, & Abrar Hussain* 3969(KUH); Karanjhar hills, 17-9-2003, *Zamarrud* 339a, 339b (KUH);ibid, 18-9-2003, *Zamarrud* 365(KUH).

Species found in Pakistan, India and Africa.

Ecological note: Grows commonly in the plains and among the rocks in association with *Lepidagathis trinervis* or sometimes with large shrubs such as *Euphorbia caducifolia, Cadaba farinosa and Capparis decidua.*

Flowering period: January-September

Barleria prionitis L., Sp. Pl. 2: 636. 1753; Chaudhri & Chuttar, l. c. 38; Malik & Ghafoor, l. c. 46. f. 8. G – K.

Shrub, upto 40 cm, tall; with c. 18 mm long, sharp, axillary spines. Leaves elliptic, lanceolate, 1.5-8.5x1.5-3.5 cm, scabrid-lineolate above , hairy below; petiolate. Flowers large, yellow, sessile, solitary in lower leaf axils. Bracts oblong-lanceolate. Calyx lobes with spine-tipped. Corolla 2-lipped. Staminodes 2, inserted. Capsule ovoid-conical, 2-seeded. Seeds orbicular.

Specimen studied: Karanjhar hills, 19-11-2002, *Zamarrud & Sarwar* 15(KUH); *ibid,* 17 – 9 – 2003, *Zamarrud & Sarwar* 336, 335 (KUH);*ibid,* 22 – 3 – 2005, *Zamarrud* 652 (KUH)

Distributed in Tropical and S. Africa, eastwards to S. E. Asia through Arabia.

Ecological note: Common on the hills while rare in the plains.

Flowering period: March-November

BLEPHARIS

Juss., Gen. Pl. 103. 1789; Malik & Ghafoor, l. c. 4; Vollesen, Taxon.Rev. Blepharis. 37. 2000.

Perennial prostrate herbs with simple, entire or spinescent leaves. Flowers in axillary clusters or strobilate spike. Bracts and bracteoles present. Clayx unequal, deeply 4-lobed. Corolla tube shorter than limb. Stamens 4, didynamous. Capsule oblong, compressed. Seeds with hygroscopic hairs.

A genus of c. 100 species, mainly distributed in the Old World Tropics. There is only 1 species in our area.

Blepharis sindica Stocks ex T. Anders in J. Linn. Soc. Bot. 9: 500. 1867; Chaudhri & Chuttar, l. c. 38; Malik & Ghafoor, l. c. 8; Vollesen, l.c.87.

Perennial herb, upto 15 cm tall,usually prostrate. Leaves sessile, simple, in whorl, linear-oblong, 15-70 x 2-4 mm, coriacious. Inflorescence strobolite spike. Flowers purple or blue; bracts ovate, 10-25 x 8-15 mm,spiny at the apex; bracteole linear to lanceolate, 10-15 mm long. Calyx lobes hairy on both sides. Corolla 1-lipped, lobes 3, central longer than laterals; tube 4 mm long, brownish hairy outside. Capsule oblong, glabrous. Seeds compressed, ovoid.

Specimen studied: (KUH); Kasbo, 20 – 11 – 02, *Zamarrud* 50 (KUH); Budhasar, 20 – 11 – 2002, *Zamarrud* 51(KUH); Karanjhar hills 15 – 9 – 2003 , *Zamarrud* 314(KUH); ibid, 24-3-2005, *Zamarrud* 675(KUH).

Distributed in Southern Pakistan and S.W .India.

Ecological note: Grows frequently on the hills in association with *Lepidagathis trinervis* and the large shrubs such as *Commiphora wightii, Capparis decidua* and *Euphorbia caducifolia.*

Flowering period: March-November.

LEPIDAGATHIS

Willd., Sp. Pl. 3: 400. 1800; Malik & Ghafoor, l. c.9.

Prostrate-erect. herbs to shrubs, sessile or petiolate leaves. Flowers in condensed spike or in capitate heads, terminal or axillary. Calyx with 5, uneven lobes. Corolla 2-lipped with evenly cylindrical tube. Stamens 4, didynamous. Capsule ellipsoid, 2-4 seeded.

Lepidagathis trinervis Nees in Wall., Pl. Asiat. Rar. 3: 96. 1832; Chaudhri & Chuttar, l. c. 39; Malik & Ghafoor, l. c. 13. f. 2. B – G.

Perennial, 10-15 cm tall, glabrous herb. Leaves linear to lanceolate, 2-4.5 x 0.2-0.5 cm, glabrous, 3-nerved parallel along midrib. Flowers sessile, pale white, purplish–pink, axillary; outer bracteoles oblong-lanceolate, inner cuneiform. Calyx lobes 5-8 mm long. Corolla spotted inside, upper lip notched, lower lip 3 lobed, obtuse, glabrescent. Ovary globose. Capsule ovoid- lanceolate, 2-seeded. Seeds oblong with hygroscopic hairs.

Specimen studied:Nagarparkar, new rest house, 24-10-1970, *Qaiser, Ghafoor & Abrar Hussain* 3954(KUH).Karanjhar hills, 20-11-2002, *Zamarrud* 72(KUH); ibid, 20-3-03, *Zamarrud* 253, 254 (KUH); Nagarparkar town, 14-9-2004, *Zamarrud* 501(KUH); Karanjhar hills, 25-3-2005, *Zamarrud* 691 (KUH).

Species found from Pakistan to India.

Ecological note: Frequently on the hills in rock crevices in association with *Blepharis sindica* and *Barleria acanthoides.*

Flowering period: March-September

JUSTICIA

L., Sp. Pl. 15: 1753; Gen. Pl. 5. 71. 1754; Malik & Ghafoor, l. c. 29.

Erect or ascending herbs or shrubs with petiolate, ovate - elliptic leaves. Flowers in spike or panicles. Calyx deeply 4-5 lobed. Corolla bilabiate. Stamens 2. Capsule 4-seeded.

The largest genus of the family with more than 400 species, chiefly disseminated in tropical and subtropical regions. Represented by one species in our area.

Justicia vahlii Roth, Nov, Pl. Sp. Ind. Orient. 14. 1821; Malik & Ghafoor, l. c.35.

Annual herb, 10-45 cm, tall with woody base; stem angular. Leaves linear-lanceolate, 1-8 x 0.3-1.8 cm, meagerly hairy; petiolate. Inflorscence spike,terminal or axillary. Flowers lilac, dark crimson, sessile; bracts ovate, yellow; bracteoles linear-lanceolate, smaller than calyx, hairy. Calyx lobes 4, linear-lanceolate, 4-5 mm long. Corolla tube infundibular, 3-4 mm long, 3-lobed. Fruit 4-angled, oblong, hairy. Seeds papillate rugose, ± concentric.

Two varieties are present in Nagarparkar.

KEY TO THE VARIETIES

1+	Herb 20-45 cm tall, stem branched. Leaves usually elliptic..... .....a, var, *vahlii*
-	Herb less than 20 cm tall, main stem absent. Leaves linear - lanceolate..... .....b, var. *sindica*

a. var. ***vahlii*** Malik & Ghafoor, l. c. 35. f. 6 A-F.

Much branched herb, 20-45 cm tall. Leaves usually elliptic, 2.5-6 x 0.6-1.5 cm .

Specimen studied:Nagarparkar, sandy hills, *Qaiser, Ghafoor & Abrar Hussain* 4060(KUH).

Commonly occurs in Pakistan and India.

b. var. ***scindica*** Malik & Ghafoor, l. c: 36. f. 6 G-J.

Differs from type variety by having stunted growth, less than 20 cm tall and without main stem. Leaves linear-lanceolate, 1-2 x 0.2-0.4 cm.

Specimen studied: Karanjhar hills, 20-11-2002, *Zamarrud* 73(KUH) ;*ibid*,74(KUH); Adhagam, 18-3-2003, *Zamarrud* 229(KUH); 26-3-2005, *Zamarrud* 732 (KUH).

Probably endemic to Pakistan (Sind).

Ecological note: Both the varieties grow frequently all over the rocky area in association with *Amranthus viridis, Digera muricata, Boerhaavia repens* and *Cleome viscosa.*

Flowering period: March-November

PERISTROPHE

Nees in Wall., Pl. Asiat. Rar. 3: 77, 112. 1832; Malik & Ghafoor,l.c.27.

Usually erect herb or under-shrubs with opposite, entire leaves. Flowers solitary or in trichotomously branched, paniculate cyme. Calyx deeply 5-lobed. Corolla bi-labiate. Stamens 2. Capsule oblong, elipsoid.

A genus of c. 30 species from East Asia to tropical Africa.

Peristrophe paniculata (Forssk.) Brummitt in Kew Bull. 38: 451. 1983;Malik & Ghafoor, l. c. 27

Dianthera paniculata Forssk., Fl. Aegypt-Arab. 7. 1775; *Peristrophe bicalyculata*(Retz.) Nees in Wall., Pl. Asiat. Rar. 3 : 113. 1832; Chaudhri & Chuttar, l. c. 40.

An annual, 20-100 cm tall; stem angular with spreading branches. Leaves simple, 4-6 x 1- 4 cm long, elliptic-ovate, pubescent; petiolate. Inflorscence terminal or axillary, lax panicle, or cymes. Flowers pink, purplish pink; bracts 2, unequal or subequal.Calyx lobes linear, valvate, 3.5-4 mm long. Corolla cylindrical, 3-5 mm long, lips subequal.Stamens well exserted. Fruit ellipsoid, hairy, acuminate. Seeds orbicular, papillate.

Specimen studied: Karanjhar hills, 24-3-05, *Zamarrud* 670 (KUH);ibid, 9-9-2007, *Zamarrud* 913(KUH).

Species occurs in Tropical Africa, S. and E. Asia.

Ecological note: Commonly grows throughout Nagarparkar in association with *Boerhaavia repens*, *Leucas urticifolia* and often with *Cadaba farinosa.*

Flowering period: February-October.

RUELLIA

L. Sp. Pl. 634. 1753; Gen. Pl. 5.283. 1754; Malik & Ghafoor, l. c. 58.

Erect or prostrate, perennial herbs with ovate-lanceolate and entire leaves. Flowers solitary axillary or in axillary cymes or in panicles, rarely spicate. Calyx and corolla 5-lobed. Stamens 4, didynamous. Ovary 2-celled, each cell 2-10 ovuled. Capsules cylindrical, ellipsoid or obovate. Seeds flat, ovate or orbicular.

A genus of c. 250 species distributed in tropical and subtropical regions of the world.

Ruellia patula Jacq., Misc. Bot. 2: 358. 1781; Chaudhri & Chuttar, l. c. 39 ; Malik & Ghafoor, l. c. 61. f. 11. C-H.

Shrublet with hoary shoots, c. 50 cm tall; stem branched quadrangular, Leaves 1-6 x 1-4.5 cm, elliptic-ovate with upto 20 mm long petiole. Flowers pale white, sessile.Calyx lobes linear-lanceolate, 3-6 mm long, Corolla tube 1.5-3.0 cm long, infundibular, tube hairy outside, obtuse. Fruit elliptic-clavate, glabrous, 8-10 seeded.

Specimen studied:Nagarparkar plains,18-3-2003, *Zamarrud* 230 (KUH); Nagarparkar plains, 16-9-2004, *Zamarrud* 570 (KUH); Karanjhar hills, 24-3-2005, *Zamarrud* 690 (KUH).

Species occurs in Tropical Africa, Arabia, Pakistan, India and Srilanka.

Ecological note: Commonly grows in the plains on well drained soil in association with *Achyranthus aspera and Peristrophe paniculata* and on the hill slopes usually in the microclimate of shrubby plants such as *Euphorbia caducifolia* and *Commiphora wightii*.

Flowering period: March-September.

2.3.2. AIZOACEAE (FICOIDEAE)

Annual or perennial, herbs. Leaves usually opposite, fleshy or scale like. Flowers solitary or in cymes. Sepals 5-8. Petals absent. Stamens 5-many, usually petaloid staminodes present. Carpels 2-5, syncarpous; ovary superior or inferior, 1-5 celled, each cell many ovuled. Fruit loculicidal capsule.

The family is represented by c. 130 genera and c.2000 species distributed in tropical and subtropical regions.

KEY TO THE GENERA

1+	Staminode petaloid.....2
-	Staminode absent if present not petaloid.....3
2+	Stamens many. Ovary 5-celled. Fruit many seeded capsule..... ...*Corbichonia*
-	Stamens few . Ovary 2-celled.Fruit 1-seeded, cocci.....*Limeum*
3+	Fruit 3-5 celled..... ... ...*Sesuvium*
-	Fruit 1-2 celled.....4
4+	Style 1, ovary 1-2 celled. Fruit a circumscissile capsule..... *Trianthema*
-	Styles 2, ovary 2-celled. Fruit dehiscing by 2 valved lid longitudinally.....*Zaleya*

CORBICHONIA

Scop., Introd. 264. 1777; Y.J. Nasir in E.Nasir & Ali, Fl. Pak. 41: 7. 1973.

Annual-perennial herb with alternate and petiolate leaves. Flowers in terminal or antiphyllous cymes. Stamens many in 2 rows; staminode petaloid, free, many. Ovary 5-celled. Capsule many seeded.

A genus of c. 2 species, one is from S. W. Africa and other from tropical Africa to Asia.

Corbichonia decumbens (Forssk.) Exell in Journ. Bot. 73: 80. 1935; Nasir, Y. J. l. c. 7. f. 2. A-E.

Orygia decumbens Forssk., Fl. Aegypt.- Arab. 103. 1775; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 80. 1964.

Annual, decumbent, reddish branched herb.Leaves lanceolate above, ovate-obovate below, 1.0-4 x 0.4-2.6 cm, acute; petiole 4.5-7 mm long. Inflorescence cyme, upto 10 cm long. Bracts lanceolate, 2.5 mm, membranous. Sepals ovate, 2-4 mm long, outside hairy, acute. Petaloid staminodes oblong, adnate. Stamens 10-15, unequal. Ovary globose. Fruit capsular, papery, dehiscent. Seeds compressed, shiny black.

Specimen studied: Budhasar, 16-3-2003, *Zamarrud* 207 KUH);Kasbo, 22-9-2003, *Zamarrud* 403(KUH); Rangers Check Post, 26-3-05, *Zamarrud* 652(KUH).

It is found in Tropical Africa, Arabia,Iran, Pakistan and India.

Ecological note: Common on the sandy soil with *Convolvulus prostratus, Zaleya pentandra* and *Trianthema portulacastrum* also on the slopes of the hills and occasionally under large shrubs.

Flowering period: February-March.

LIMEUM

L., Sys. Nat. ed. 10. 995. 1759; Y.J.Nasir, l. c. 10.

Prostrate herb-shrublets with opposite or alternate leaves. Flowers solitary or in axillary cymes. Stamens 7, staminodes c. 5, petaloid, clawed. Ovary 2-celled. Fruit of 2 cocci, each 1-seeded.

A genus of c. 20 species, distributed mostly in S. Africa and also in tropical Africa, Arabia, Pakistan and India.

Limeum obovatum Vicary in J. Asiat. Soc. Bengal 16: 1163 1847; Y.J. Nasir, l. c. 11. f. 2. N-W.

Annual, prostrate herb. Leaves elliptic, ovate to sub-orbicular 1.5-11 x 1-12 mm; petiole 2-3 mm long, glandular. Bracts ovate, lanceolate. Sepals 5, lanceolate 3-5 x 1-1.5 mm, white. Stamens monadelphous. Ovary reddish, brown; mericarp smooth, brown. Seeds, light brown, compressed.

Specimen studied: Nagarparkar plains, 22-9-03, *Zamarrud* 413 (KUH).

It is found in SW Africa, Sudan, Ethiopia, Arabia and Pakistan.

Ecological note: Rarely found on sandy plains.

Flowering period: September-October.

SESUVIUM

L., Syst. ed. Nat. 10: 1058. 1759; Y.J. Nasir, l. c. 2; F. R. Fosberg in M.D.Dassanayake, Fl. Cey(rev.).11:1. 1997.

Annual herb with branched and opposite leaves. Stamens 5-many. Ovary 3-5-celled. Capsule dehiscent, circumscissile.

A genus of c. 12 species found in the warm regions, mainly on the coast.

Sesuvium sesuvioides (Fenzl) Verdc in Kew Bull. 349. 1957; Y. J.Nasir, l. c. 2. f. 1. L-O.

Diplochenium sesuvioides Frenzl, Nov. Strip. Dec. 7: 58. 1839.

Annual, diffusely pronged, prostate herb. Leaves petiolate, opposite, elliptic-ovate, 4-15 x 1.5-6 mm. Flowers sessile, axillary, solitary.Calyx campanulate, nerved; sepals 3-4.5 mm

long, aristate. Stamens 5-7 alternate. Ovary 3-5 celled. Fruit many seeded, Seeds rugose, black, minute.

Specimen studied: Karanjhar hills, 24-9-2005, *Zamarrud* 848(KUH).

Species found in Africa, Arabia, Iran, Pakistan and India.

Ecological note: Found frequently on the hills and on sandy wet places abundantly.

Flowering period: September-October.

TRIANTHEMA

L., Sp. Pl. 223. 1753; Gen. Pl. 5. 105. 1754; Y.J. Nasir, l.c. 5; F. R. Fosberg, l.c.3.

Annual-perennial herb with opposite, unequal leaves. Flowers axillary, solitary or in clusters. Calyx with a sub-terminal, dorsal appendages. Petaloid stamens absent. Style 1; ovary 1-2-celled. Fruit a capsule dehiscent, circumscissile.

A genus of c. 17 species, distributed in warm regions, mainly in Australia where 10 out of 12 species are endemic.

KEY TO THE SPECIES

1+	Flowers in cluster, clearly visible. Stamens 5..... *T. triquetra*
-	Flowers solitary, hidden by the membranous base of the petiole. Stamens 10-15..... ..... *T. portulacastrum*

Trianthema triquetra Rottl. & Willd. in Ges. Naturf. Fr. Neue. Schr. 4: 181. 1803; Y. J.Nasir, l. c. 6. f. 1. E-H; F. R. Fosberg, l.c.6.

Annual, diffusely branched, papillose herb. Leaves elliptic-ovate, oblanceolate, 0.3-1.2 x 0.2-3.5 mm. Flowers sessile-subsessile; bracts 2-3 mm long, ovate, acuminate. Calyx 5-lobed, persistent, 3-9 mm long, reddish, pink. Stamens 5, alternate to sepals. Ovary turbinate. Pyxidium 2 x 1.5 mm, flat, depressed in the centre. Seeds black, rugose, flattend.

Specimen studied: Nagarparkar, 19-11-2002, *Zamarrud* 34(KUH); Kasbo, 19-11-2002, *Zamarrud* 40 (KUH); Budhasar, 19-11-2002, *Zamarrud* 55(KUH); Near Ranger's check post, 17-9-03, *Zamarrud* 332 (KUH);ibid, 24-9-2005, *Zamarrud* 880 (KUH).

Species found in Africa, Arabia, Iran to Australia.

Ecological note: Species found in less sandy and wet places abundantly with *Zaleya pentandra, Corchorus aestuens, C. trilocularis* and large shrubs such as *Prosopis juliflora* and trees like *Prosopis cinerarea*.

Flowering period: September- October.

Trianthema portulacastrum L., Sp. Pl. 223. 1753; Y. J.Nasir, l. c. 5. f. 1. I-K; F. R. Fosberg, l. c.5.

Annual, 30-35 cm long herb. Leaves oblong, obovate, 1.2-2.6 x 0.5-2.5 cm.obtuse or acute, long papillose, serrate-entire; petiole 2-11 mm. Flowers axillary, solitary, sessile. Calyx tube enclosed by the leaf base; sepals 5, oblong, 2.5-3.5 mm long. Stamens 10-15, uneven. Ovary conical, c. 4 mm, 4-5 seeded, lid 2.5-3.0 mm broad. Seeds rugose, black.

Specimen studied: Nagarparkar, 17-9-2003, *Zamarrud* 333(KUH); Budhasar,23-9-2003, *Zamarrud* 354 (KUH).

It is a Pantropical weed.

Ecological note: Grows commonly in Nagarparkar plains and the hills. Flowering period: September- October.

ZALEYA

Burm. f., Fl. Ind. 110, t. 31. 1768; Y.J.Nasir, l. c. 2; H.E.K.Hartmann in K.Kubitzki, Fam. & Gen.Vasc. Pl.2: 45. 1993.

Herb to undershrub, prostrate with opposite exstipulate leaves. Flowers in axillary clustered. Calyx 5-lobed. Stamens 5-15, free. Ovary 2-celled. Capsule 4-seeded, dehiscent.

A genus of c. 6 species, distributed in tropical Africa, Asia and Australia.

Zaleya pentendra (L.) Jeffery in Kew Bull. 14(2) 238. 1960; Y.J.Nasir, l. c. 2. f. 1. A-D.

Trianthema pentendra L., Mant. 1: 70. 1767.

Perennial. Leaves oblong-obovate, oblanceolate, elliptic, 1.5-4 x 0.6-2.7cm, petiole 5-11 mm with papillose sheathing base. Bracteoles 1-3, lopsided, scarious. Calyx persistent papillose; sepals oblong, ovate, 1.5-4x1-2 mm. Stamens 5, polyandrous, epipetalous. Ovary pyramidal, papillose. Capsule 1.4-5mm long. Seeds black, rugose.

Specimen studied: Ranger's check post, 19-3-2003, *Zamarrud* 252 (KUH).

Species found in India, Pakistan, Iran, Arabia, Palistine, T.Africa and Madagascar.

Ecological note: Common species of sandy plains especially on wet places with *Boerhaavia repens, Digera muricata* and *Amaranthus* spp.

Flowering period: All round the year.

2.3.3. AMARANTHACEAE

Usually annual or perennial herbs. Leaves simple, alternate or opposite. Flowers in dense spikes or racemes; polygamous. Sepals 3-5, free. Petals absent. Stamens 3-5, monadelphous. Carpels 2-3, syncarpous; ovary superior, 1-celled, 1-ovuled. Fruit utricle or nut rarely capsule.

A family of c. 70 genera and c.750 species, distributed in tropical and warm regions.

KEY TO THE GENERA

1+	Fertile flowers covered by modified sterile flowers formed into wings, scales, spines, hairs or bristles.....2
-	Modified sterile flowers absent.....3
2+	Leaves alternate. Modified sterile flowers represented by scale like staminode.....*Digera*
-	Leaves opposite.Modified sterile flowers represented by hooked spines.....*Pupalia*
3+	Ovary with several to many ovules.....*Celosia*
-	Ovary with 1 ovule.....4
4+	Pseudo-staminode absent.....*Amaranthus*
-	Pseudo-staminode present.....5
5+	Flowers bisexual, bracteoles strongly spinescent at apex.....*Achyranthes*
-	Flowers unisexual (in ours), bracteoles mucronate or aristate but not spinescent.....*Aerva*

ACHYRANTHUS

L., Sp. Pl. 1: 204. 1753; Gen. Pl. 5. 96. 1754; C.C. Townsend in E.Nasir & Ali, Fl. Pak. 71: 33. 1974; in Kubitzki, Fam.& Gen. Vasc. Pl.2: 87. 1990.

Herbs with opposite leaves. Flowers in terminal spike. Bracts with a midrib excurrent in a spike. Perianth segments 4-5. Stamens alternating with staminode.Fruit utricle.

A genus of 6-8 species of Old World tropics or subtropics. One species is represented from the area.

Achyranthes aspera L., Sp. Pl. 1: 204. 1753; Chaudhri & Chuttar, Veg. Rang.Fl. Thar desert, 40. 1966; C.C .Townsend, l. c. Fl. Pak. 71: 33. f. 6. E. 1974.

A. aspera var. *indica* L., Sp. Pl. 1: 204. 1753.

Perennial herb, 15-25 cm tall, densely tomentose hairy; stem much branched angular, sulcate. Leaves elliptic, oblong, 1.5-16 x 1-6 cm.Inflorescence peduncled, terminal spike, dense hairy, Perianth segments white, pale green, red or purple, outer segments longer than inner, lanceolate. Stamens 5.Seeds cylindrical, smooth.

Specimen studied: Nagarparkar, 25-10-1970, *Qaiser, Ghafoor & Abedin* 4053(KUH); Nagarparkar, sandy plains, 19-3-2003, *Zamarrud* 231 (KUH); Kasbo, 24-3-2005, *Zamarrud* 674 (KUH).

Common species of Pakistan and India and most part of the tropical regions of the world.

Ecological note: Grows commonly throughout sandy and rocky areas in association with *Amaranthus spinosus, Aerva javanica* and *Boerhaavia repens.*

Flowering period: March-October

AMARANTHUS

Forssk., Fl. Aegypt. Arab. 170. 1775; C.C. Townsend, l. c. 25; in Kubitzki, l.c.81.

Dioecious or sometimes polygamous, erect-prostrate, perennial herb with entire and usually alternate leaves. Flowers in spike or panicles.Perianth segment and stamens usually equal. Fruit a thin walled utricle, rupturing irregularly. Seeds black.

A genus is represented by 10 species mainly distributed in the tropics. Three species present in the area.

KEY TO THE SPECIES

1+	Leaves with paired spines in their axis. ..... *A. spinosus*
-	Leaves without spines in their axis.....2
2+	Inflorescence axillary..... *A. graecizans*
-	Inflorescence terminal..... *A. viridis*

Amaranthus graecizans L., Sp. Pl. 2: 990. 1753. M.D. Dassanayake & F. R. Fosberg in M.D. Dassanayake, Fl. Cey (rev.) 1: 20. 1980.

Subsp. ***thellungianus*** (Nevski) Guseu in Bot. Zhurn. 57: 462. 1972; C.C. Townsend; l. c. 17. f. 2. E-G.

Amaranthus thellungianus Nevski in Act. Acad. Sc. U. R. S. S. 1(4): 311. 1937.

Annual, upto 45 cm, branched, herb; stem slender- stout, decumbent or prostrate, angular, multicellular hairy. Leaves 3-55 x 1.5-30 mm, linear, rhomboid-spatulate, ovate, acute to obtuse. Flowers axillary in cyme; male and female flowers intermingled.Male flowers in upper whorl. Stamens 3. Female numerous in lower whorl; bracts and bracteoles subequal or shorter than the perianth. Perianth segments 3, narrow. Fruit urceolate.Seeds compressed, black, shining.

Specimen studied: Budhesar, Nagarparkar, 25-10-1970, *Qaiser, Ghafoor & Abrar Hussain* 4092 (KUH); Nagarparkar, sandy plains 26-3-2005, *Zamarrud* 700(KUH).

Amaranthus graecizans subsp. *thellungianus* is found widely in India, Pakistan and Middle East. The type subspecies does not occur in our region.

Ecological note: Grows in sandy plain areas occasionally with *Amaranthus viridis* and *Cenchrus biflorus.*

Flowering period: March-Ocotober

Amaranthus spinosus L., Sp. Pl. 2: 991. 1753; C.C. Townsend, l. c. 9. f. 2. C-D; M.D. Dassanayake & F. R. Fosberg, l. c. 9.

An annual, decumbent, 0.5-1.5 m tall, herb.Leaves 1.5-12 x 0.8-6 cm, ovate, elliptic, lanceolate- oblong, subacute; petiole c. 9 cm long; spines paired, axillary. Female flowers: present at the base, green, clustered, axillary; perianth segments 5, rarely oblong or spatulate, oblong. Male flowers: flowers present above, bracts and bracteoles with red awned at the tip. Perianth segments 5, lanceolate-oblong. Stamens 5.Fruit ovoid-urceolate. Seeds compressed, black, reticulate.

Specimen studied: Karanjhar hills, Maya dam, 11-3-2003, *Zamarrud & Sarwar* 103 (KUH); Kasbo, 18-3-2003, *Zamarrud* 211 (KUH);*ibid* 212 (KUH).

As cosmopolitan weed in warmer regions.

Ecological note: Grows at foot hills near water bodies in association with *Amaranthus viridis, Digera muricata* and *Celosia argentea.*

Flowering period: February-September

Amaranthus viridis L., Sp. Pl. ed. 2. 1405. 1763; Chaudhri & Chuttar, l. c. 42; C.C. Townsend, l. c. 14. f. 2.A-B; M.D. Dassanayake & F. R. Fosberg, l.c.19.

An annual herb, 30-45 cm tall, green. Leaves ovate, elliptic, linear-lanceolate, 2-7x 1.5-5.5 cm. Flowers in axillary cymose clusters, sessile–subsessile. Male and female

intermingled; bracts 3 mm long; bracteoles lanceolate to oblong. Stamens 3. Fruits subglobose to ovoid. Seeds compressed, black, reticulate.

Specimen studied: Karanjhar hill near Maya dam, 18-3-2003, *Zamarrud, Sarwar & Adil* 218 (KUH); Own-jo –Wandio, 26-3-2005, *Zamarrud* 701 KUH).

A common species of tropical and subtropical regions of the world.

Ecological note: Common in the sandy plains in association with *Boerhaavia repens, Digera muricata* and different grasses

Flowering period: Round the year

AERVA

Forssk., Fl. Aegypt. Arab. 170. 1775; C. C. Townsend, l. c. 25;in Kubitzki, l.c. 85; M. D. Dassanayake & F. R. Fosberg, l. c. 30.

Erect-prostrate, perennial herb with entire and usually alternate leaves. Flowers in spike or panicles; bisexual or unisexual .Perianth segment and stamens 5 each. Ovary with 1-ovule. Fruit a thin walled utricle, rupturing irregularly. Seeds black.

A genus is represented by 10 species, distributed in the tropics.

Aerva javanica (Burm. f.) Juss. ex. J. A. Schultes, Syst. Veg. 15, 5: 565. 1819; Chaudhri & Chuttar, l. c. 41; C. C. Townsend, l. c. 26. f. 4. A-B; M. D. Dassanayake & F. R. Fosberg, l. c. 31.

Dioecious, perennial herb, 35-120 cm tall. Leaves alternate 0.2-5 x 2-4 cm, lanceolate, linear to suborbicular; petiolate. Inflorscence with male & female flowers in different cylindrical spikes. Male flowers: small,outer tepals upto 2.25 mm, ovate. Female flowers: perianth segments 5, outer two 2-3 mm, oblong, obovate, inner three slightly shorter; Fruit rounded, compressed. Seeds brown or black.

Specimen studies:Nagarparkar, 25–10–70, *Qaiser, Ghafoor & Abrar Hussain* 3989 (KUH); Through out sandy –rocky areas, 26-3-2005, *Zamarrud* 702, 703, 708 (KUH).

Wide spread species in the arid parts of the tropics and subtropics of the Old World.

Ecological note: *Aerva javanica* is considered good soil binder, common on the sandy plains in association with *Crotalaria burhia, Leptadenia pyrotechnica, Calligonum polygonoides* and *Panicum turgidum* and on the hills grows occasionally in association with *Panicum turgidum, Euphorbia caducifolia* and other shrubs.

Flowering period: February- October

CELOSIA

L. Sp. Pl. ed. 1: 205, 1753; Gen. Pl. 5. 96. 1754; C.C., Townsend, l. c. 4; in Kubitzki, l.c.80.

Annual or perennial herb with alternate simple leaves. Flowers usually in spike; perianth segments 5, free. Stamens 5, connate below. Ovary with few-many ovules. Capsule circumscissile.

A genus of c.15 species, distributed in warmer regions of both the Worlds.

Celosia argentea L., Sp. Pl. 1: 205. 1753; Chaudhri & Chuttar, l.c. 41; C.C., Townsend, l. c. 5. f. 2. C-D.

Ascending, branched, upto 2 m tall annual.Leaves simple, alternate, lanceolate-oblong 1.5-15 x 0.1-3.2 cm including petiole.Inflorscence dense spike, conical, silver-pink; peduncle upto 20 cm long; bracts and bracteoles lanceolate or deltoid. Perianth segments elliptic-oblong. Ovary ovoid, 4-8 ovuled. Fruit ovoid-globose. Seeds black, usually compressed, reticulate.

Specimen studied: Budhesar, sandy plains, 25-3-2005, *Zamarrud & Alam* 699 (KUH).

A pantropical weed.

Ecological note: In Nagarparkar it grows widely covering maximum area on the plains during the period of monsoon and also common at foot hills in association with *Amaranthus viridis, Boerhaavia repens* and *Digera muricata*

Flowering period: February- October

DIGERA

Forssk., Fl. Aegypt-Arab., 65. 1775; C.C. Townsend, l. c. 21; in Kubitzki, l.c.81; M.D. Dassanayake & F. R. Fosberg, l.c. 23.

Annual herb with alternate leaves. Flowers in spike like racemes; fertile in the centre, lateral sterile. Perianth segments and stamens 4-5 each. Ovary with a single ovule. Fruit a hard, indehiscent nutlet.

A monotypic genus, distributed in Asia and Africa.

Digera muricata (L.) Mart. in Nov. Act. Acad. Caes. Leop-Carol. 13 (1): 285. 1826; Chaudhri & Chuttar, l. c. 42; C.C. Townsend, l. c. 21. f. 3. A-C; M.D. Dassanayake & F. R. Fosberg, l.c. 23.

Achyranthus muricata L., Sp. Pl. ed. 2. 295. 1762.

Annual, glabrous or sparsely hairy with alternate branches, 8-73 cm tall. Leaves linear-ovate usually glabrous, 1.5-10 x 0.4-3.5 cm; petiole 2-5 cm long. Flowers pink to red, in long slender raceme, peduncle 12-30 cm long; bracts persistent, subtending a pedunculate partial inflorescence of 3 flowers. Perianth segments oval or oblong.Nutlet subglobose.

Specimen studied: Budhasar, 26-10-1970, *Qaiser,Ghafoor & Abrar Hussain* 4093(KUH); Karanjhar hills, 17-9-03, *Zamarrud & Alam* 331, 337 (KUH); Raharko, 24-9-2005, *Zamarrud* 847(KUH).

A cosmopolitan species.

Ecological note: Common weed of cultivated fields and waste places, grows most commonly in association with *Amaranthus viridis, Boerhaavia repens, Zaleya pentendra, Gynandropsis gynandra* and *Cleome viscosa.*

Flowering period: February- September

PUPALIA

Juss in Ann. Muss. Par. II: 132. 1803(*nom. cons.*); C.C. Townsend,l. c. 23; in Kubitzki, l.c.85.

Perennial herb with opposite and entire leaves. Flowers in terminal spike or in clusters of 3; subtended by the sharpy hooked spiny bracts. Perianth segments and stamens 5 each. Ovary with one ovule. Fruit a thin walled utricle.

A genus of 2-3 species, distributed in old World tropics.

Pupalia lappacea (L.) Juss., Ann. Mus. Hist. Nat. Paris 2: 132. 1803; Chaudhri & Chuttar, l. c. 43; C.C. Townsend, l. c. 24. f. 3. D-G; M.D. Dassanayake & F. R. Fosberg, l.c. 28.

Achyranthes lappacea L., Sp. Pl. I: 204. 1753.

Perennial herb, 20-40 cm tall.Leaves opposite,oblong, ovate-elliptic to orbicular, 1.5-12x0.5-6 cm, acuminate to apiculate, cuneate; petiole 2-25 mm long. Inflorescence 10-25 cm long, peduncled spike. Flowers bisexual, usually in cluster of 3 sometime solitary in

the upper of the infloresence; bracts 5, lanceolate, acute,bracteoles ovate-cordate; tepals oblong, yellow to purple. glabrous, 3-nerved, spines of modified. Sterile flowers: reduced to briste, glabrous hooked awn, yellowish-purple. Ovary with a single pendulous ovule. Fruit utricle, ovoid. Seeds ovoid, slightly compressed.

Specimen studied: Nagarparkar, 26-10-1970, *Qaiser,Ghafoor & Abrar Hussain* 4059 (KUH); Karanjhar hills, 24-11-2002, *Zamarrud* 81, 100 (KUH); Budhasar, 18-3-2003, *Zamarrud* 220(KUH); Near Salamkot on way to Nagarparkar, upto 20 cm tall,20-9-2005, *Zamarrud* 811 (KUH).

Wide spread species of tropical and subtropicals regions of the Old World.

Ecological note: A fairly common species of the plains while occasional on the hills.

Flowering period: March-January

2.3.4. ASCLEPIADACEAE

Perennial herbs, rarely shrub, sometimes vine. Leaves stipulate, simple, opposite or whorled. Flowers usually in racemose or umbellate cymes. Sepals 5, petaloid. Petals 5, connate. Stamens 5, usually connate forming a staminal tube around the ovary, apex of the tube adnate to the stigma forming gynostegium, pollinia usually present, epipelatous. Carpels 2, apocarpous; ovary superior, each 1-celled, many ovuled. Fruit an etaerio of 2-folicles.

Family comprising c.315 genera and c.2900 species, distributed in tropical and warm regions, mainly in Africa. Four genera are reported from Nagararkar.

KEY TO THE GENERA

1+	Plant with watery sap.....*Leptadenia*
-	Plant with milky sap.....2
2+	Plant erect. Leaves large, sessile. Folicles inflated.....*Calotropis*
-	Plant twining. Leaves smaller, petiolate. Folicles not inflated.....3
3+	Pollinia pendulous. Folicles echinate.....*Pergularia*
-	Pollinia erect or rarely patent. Folicles smooth.....*Telosma*

CALOTROPIS

R. Br. in Mem. Wern. Soc. 1: 39. 1810; Ali in E. Nasir & Ali, Fl. Pak. 150. 6. 1983; Li Ping-tao; Michael G. Gilbert, W. Douglas Stevens, Fl. China, 16:202. 1995.

Shrub or small tree with opposite decussate leaves. Flowers in terminal or axillary umbelloid cymes. Corona of 5, fleshy lobes. Anthers in a solitary pollinium. Stigma pentagonal. Fruit an inflated follicle.

A genus of c. 4 species, distributed in the tropics and subtropics of Africa and Asia, introduced in America. One species from the area.

Calotropis procera (Ait.) Ait. f., Hort. Kew. 2. 2: 78. 1811; Ali, l. c. 7. Li Ping-tao; Michael G. Gilbert, W. Douglas Stevens.l.c. 202.

Asclepias procera Ait., Hort. Kew. ed. 1.1: 305. 1789.

Subsp. ***hamiltonii*** (Wight) Ali in Notes RBG Edinb. 38(2): 289. 1980; Ali, l.c.7. f. 1. A-G.

C. hamiltonii Wight, Contrib. Bot. Ind. 53. 1834.

Shrub, upto 3 m tall with rich milky sap, usually white tomentose in the upper part. Leaves ± sessile, 5-15 x 1.8-10 cm, ovate-oblong, entire, acute, cordate. Flowers white outside, purplish inside, c. 2.5 cm across; pedicel 1.5-4.2 cm long. Calyx deeply 5-lobed.Corolla 5-lobed; glabrous;corona of 5, fleshy, laterally compressed lobe radiating from the gynostegium, each with a recurved vesicle at the base and a pair of auricles at the apex. Fruit 6.5-9.5 x 3-5.1 cm. Seeds flat, broadly ovate, 6-8 mm long, comose, coma 3-3.5 cm long.

Specimen studied: Salamkot desert-Nagarparkar, 15-9-2003, *Zamarrud* 309 (KUH).

Distributed in India, Pakistan and Iran. The type subspecies does not grow in our area.

Ecological note: Grows throughout the sandy plains and the slopes of the hills with *Grewia tenax, Capparis decidua, Euphorbia caducifolia Acacia senegal* and *Prosopis cineraria.*

Flowering period: All the year round.

LEPTADENIA

R. Br. in Mem. Wern. Soc. 1: 34. 1810; Ali, l. c.51.

Erect or climbing shrub. Flowers in umbelloid cymes. Corona double of 5 segments. Anther incumbent on stigma. Pollinium 1 in each locule. Fruit a follicle with comose seeds.

A genus of c. 10 species found in the tropics in Asia and Africa. One species is present in our area.

Leptadenia pyrotechnica (Forssk.) Decne. in Ann. Sci. Nat. Ser. 2. 9: 269. 1839; Ali, l. c. 52. f. 12. A-D. *Cynanchum pyrotechnicum* For ssk., Fl. Aeg-Arab. 53. 1775; *Leptadenia spartium* Wight, Contr. Bot. Ind. 47. 1834; Chaudhri & Chuttar, Veg. Rang.Fl. Thar desert, 44.1966.

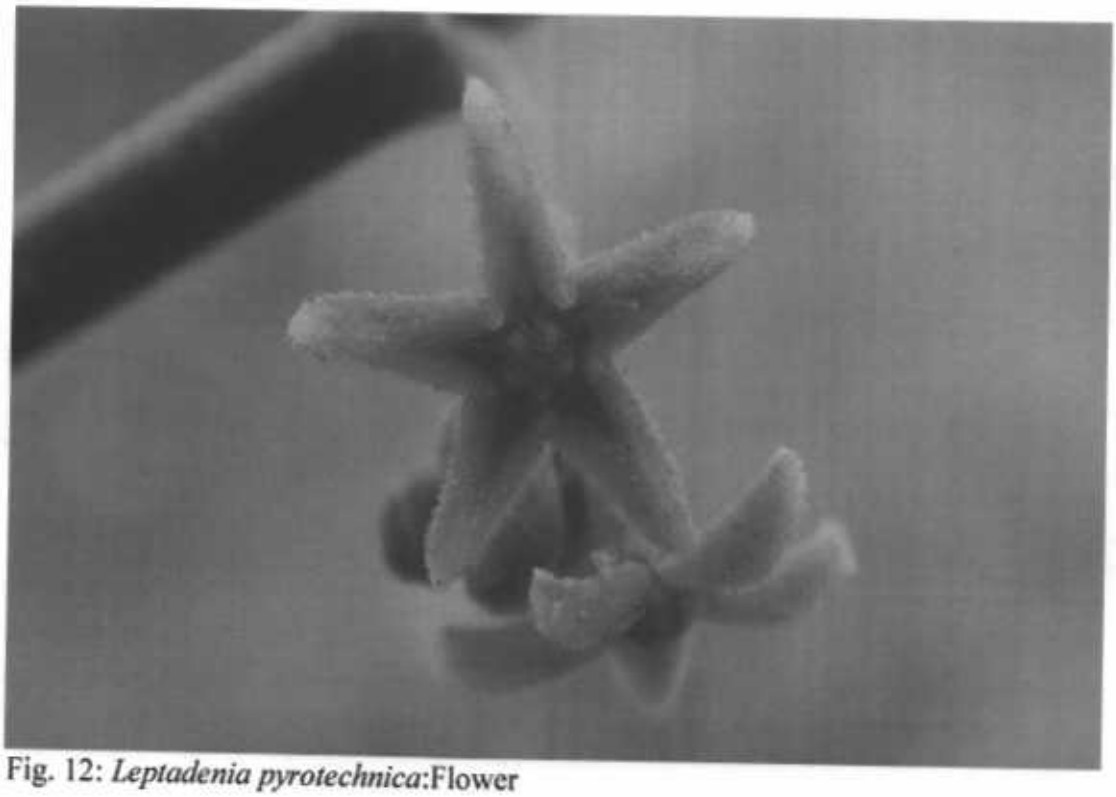


Fig. 12: *Leptadenia pyrotechnica*:Flower

Much branched perennial herb, 50-180 cm tall. Leaves deciduous; simple, opposite, linear-lanceolate, 2.5-6 x 0.2-0.5 cm. Flowers in umbellate cymes; peduncle 2-8 mm long. Pedicel c .2.5 mm long, pubescent. Calyx 1.5-2 mm long, pubescent outside.Corolla pale yellow, longer than calyx. Follicles glabrous, 7.5-11.5 x 0.6-0.7 cm, lanceolate.Seeds 8-9 mm, comose, coma 2.5-4 mm long.

Specimen studied: Nagarparkar,25-10-70, *Qaiser, Ghafoor & Abrar Hussain* 3923 (KUH);Salamkot desert-Nagarparkar, 26-3-2005, *Zamarrud* 705(KUH).

Distributed in India, Pakistan, Arabia and Egypt.

Ecological note: Fairly common in the plains while occasional on the hills in assosiation with *Calotropis procera, Capparis decidua* and *Cadaba farinosa.*

Flowering period: March-August

PERGULARIA

L., Syst. Nat. ed. 12: 191. 1767; Ali, l. c. 26

Climbing herbs with milky sap branches; hispid or prickly. Leaves cordate hairy on both sides. Corona double, each of 5 segments. Pollinium solitary in each locule. Follicle echinate with comose seeds.

A genus of 3-5 species, found in Africa and South Asia. One is found in our region.

Pergularia daemia (Forssk.) Chiov. in Result. Sc. Miss. Stefanini Paoli Somal. Ital. I: 115. 1916; Ali, l. c. 28. f. 7. A-C.

Asclepias daemia Forssk., F. Aegypt.-Arab. 51.1775.

Perennial, climbing, herb , branched, hairy. Leaves ovate or sub-orbicular, 5-15x1.5-9.5 cm; petiole 2-9 cm long. Flowers in lateral cyme; pedicel 1.8-3.5 cm long; bracts minute, lanceolate.Sepals 2-3 mm long.Corolla greenish yellow.Follicles lanceolate, beaked, puberulous. Seeds brown, coma 2.5-3.0 cm long.

Specimen studied: Karanjhar hills, 25-3-2005, *Zamarrud* 697 (KUH).

Distributed in Malaysia, Srilanka, Mayanmar, India, Pakistan, Afghanistan and Arabia.

Ecological note: Usually found spreading over *Zizyphus nummularia* and *Prosopis juliflora* at foot hills.

Flowering period: March-August.

TELOSMA

Coville in U.S. Dept. Agr. Contrib. Nat. Herb. 9: 384. 1905; Ali, l.c.39.

Climbing shrub with ovate to broadly ovate leaves. Flowers in umbeloid cyme.Corona arising from the staminal column. Pollinia solitary in each locule. Follicles smooth with comose seeds.

There are 10 species, found in the tropics of the old world. One is found in our region.

Telosma cordata (Burm.f.) Merrill in Philipp. J. Sci. 19: 372. 1912. Ali, l. c. 40. f. 9. E-H.

Asclepias cordata Burm. f., Fl. Ind. 72. t. 27. f .2. 1768.

Climbing, branched, shrub, pubescent. Leaves 5-10.5 cm long, ovate, glabrous or puberulous on nerves, cordate, acuminate; petiole 1.2-3.8 cm long. Inflorescence

umbellate cyme,long peduncled. Flowers bracteate: bracts linear, caducous; pedicel 1-3 cm long, hairy. Corolla pale yellow, salver- formed. Calyx lobes 5 mm long, hairy outside, tube smaller than lobes Corona adnate to the staminal column. Pollinia solitary.Follicle solitary, 3.5-10 x 1.8 cm, straight, smooth, tapering. Seeds c.1 cm long, flat, pale-brown, comose.

Secimen studied: Karanjhar hills, 25-3-2005, *Zamarrud* 696(KUH).

Distributed in Malaysia, Myanmar, India and Pakistan.

Ecological note: An Indian element,climbes on *Ziziphus nummularia* and *Prosopis juliflora* on the slopes of the hills.

Flowering period: February-March.

2.3.5. ASTERACEAE (COMPOSITAE)

Mostly herbs, rarely shrubs or arborescent. Leaves alternate or opposite, simple, pinnately or palmately lobed or compound. Flowers in heads (Capitula) with involucre phyllaries at the base, receptacle paleate or epaleate, capitula heterogamous or homogamous, ray florets usually pistillate, fertile or sterile; disc florets tubular. Stamens 5, mostly syngenesious. Carpels 2, syncarpous; ovary inferior, 1-celled, 1-ovuled. Fruit a cypsela.

The largest family with more than 1530 genera and c. 23000 species of cosmopolitan distribution.

KEY TO THE GENERA

1+	Plants with latex. Ligules 5-lobed.....2
-	Plants without latex. Ligules 3-lobed.....3
2+	Plants with white latex . Phyllaries swollen at the base at maturity. Cypselas homomerous.....*Sonchus*
-	Plants with yellow latex.Phyllaries membranous.Cypselas heteromerous.....*Launaea*
3+	Leaves opposite. Cypselas black.....*Eclipta*
-	Leaves alternate. Cypselas of various colours but never black.....4
4+	Spiny herb.....*Oligochaeta*
-	Herbs not spiny.....5
5+	Anthers without tail. Outer pappus short, connate, cupuliform.....*Pulicaria*
-	Anthers with branched tail. Outer pappus free.....*Vernonia*

ECLIPTA

L., Mant. Pl. 2: 157, 286. 1771. nom. Cons.

Annual-perennial herb with simple, opposite leaves, strigose on both sides. Flowers solitary or in fascicles. Capitulla radiate, heterogamous, ray florets, pistillate bisexual, disc florets 2, minute, weak scales, bisexual, tube 4-lobed. Cypsela with or without pappus.

A small genus of 3-4 species, distributed in the warmer regions all over the world.

Eclipta prostrata (L.)L., Mant. Pl. 286. 1771; Jafri. Fl. Kar. 340. f. 334. 1966.

Verbesina prostrata L., Sp.Pl. 962.1753

Annual, herb, 20-(45)-60 cm long, densely strigos hairy. Stem dark brown. compressed, branched from the base , sulcate, erect, ascending or prostrate. Leaves 1-12 x 0.3-1.8 cm, sessile, opposite elliptic, oblong-elliptic, lanceolate or oblong-lanceolate. Capitula radiate, axillary on slender, (1-1.5)-1.8 cm long peduncles. Involucre 7-9 mm broad; outer phyllaries 4 x 2 mm, broadly lanceolate, subacute, hairy. Ray florets white, pistillate, fertile. Disc florets white-yellowish,tubular, 4-lobed, hermaphrodite, fertile. Cypsela of disc florets yellowish brown, 3-3.5 mm long, 4 angular; of ray florets black, compressed, winged; pappus of very short scales or crowned.

A cosmopolitan weed of warm climates.

Specimen studied: Budhasar, 15-9-1987, *Ajmal Khan & Qaiser* 120 (KUH); Nagarparkar, 15-3-2003, *Zamarrud* 153(KUH); Kasbo, cultivated field, 17-9-2003, *Zamarrud* 342 (KUH).

Ecological note: Common on sandy plains along seasonal streams and moist places with *Lepidagathis and trinervis and Blepharis sindica,* also sometimes in the clumps of *Euphorbia caducifolia.*

Flowering period: March-September.

LAUNAEA

Cass., Dic. Sc. Nat. 25: 321. 1822; Jafri, l. c.347; M.D. Dassanayake & F. R. Fosberg in M.D. Dassanayake, Fl. Cey (rev.). 1:275. 1980.

Annual-perennial herb with erect to prostrate stem. Leaves alternate or rosulate, oblanceolate, sinuate-dentate, scarious. Capitulla solitary or fascicled on short peduncle or sessile.Involucre bracts campanulate; phyllaries 3-4 seriate with scarious margin. Flowers 5-ligulate. Anther bases caudate. Cypsela 4-5 angular.

Launaea procumbens(Roxb.) Ramayya & Rajgopal in Kew Bull. 23:465. 1969.

Pretanthes procumbens Roxb., Fl. Ind. 3:404.1832.

Diffusely branched, stem, flexuous, upto 65 cm long usuall with redical leaves ;sessile, lobed with scarious margin. Capitulla with yellow rayed usually 5-10 in lateral clusters. Cypsela smaller than pappus.

Distributed in India and Pakistan. 1 species found in our region.

Specimen studied: Cultivated plains, 20-9-2005, *Zamarrud* 835KUH).

Ecological note: Common species of the plains.

OLIGOCHAETA

(Roxb.) Wagenitz in veroff, Geobot. Inst. (Zurich.) 37: 323. 1962.

Annual, hairy with alternate, dissected leaves. Flowers violet or blue arranged in homogamous head. Involucre phyllaries spiny, inner narrow acute, outer with short awned. Receptacle bristly. Anther bases saggitate, connate with short tailed. Cypsela pitted between the ribs. Pappus long, densely spiny, many seriate.

A genus of c. 4 to 5 species mainly found India, Pakistan and Afghanistan.

Oligochaeta ramosa (Roxb.) Wagenitz in veroff, Geobot. Inst. (Zurich.) 37: 323. 1962.

Caduus ramosus Roxb. Fl. Ind. 3: 407. 1832.

Many branched, annual herb, usually erect - suberect, rarely prostrate, minutely scabrid, branches upto 70 cm long. Leaves 2-5.5 x 0.5-2 cm, sessile, deeply lobed- subentire; basal leaves rosulate. Head ovoid-oblong, 1-2.5 x 0.5-1.2 cm. Cypsela upto 6 mm long.

Distributed in India, Pakistan and Afghanistan.

Specimen studied: Cultivated plains, 15-3-2003 *Zamarrud* 154(KUH).

Ecological note: Fairly common species of the plains especially near cultivated fields. On the hills *Oligochaeta ramosa* grows in association with *Lepidagathis trinervis*.

Flowering period: March- September.

PULICARIA

Fruct. 11. 461. t. 173. 1791; Qaiser & Abid in Ali & Qaiser, Fl. Pak. 210: 57. 2003.

Annual herb-shrub with alternate, simple, usually hairy leaves. Capitula solitary to dense clusters, heterogamous-radiate or disciform or homogamous-discoid. Involucre phyllaries 2-6 seriate, florets yellow. Rayflorets pistillate, shortly radiate or filiform, few.Disc floret, bisexual, numerous, tubular. Cypselas sometimes ribbed, glandular hairy; pappus 2-serriate, outer one of connate scale forming a cupule, inner ones longer, free.

A genus of c. 80 species, found in Asia, Africa and Europe.

Pulicaria angustifolia DC. Prodr. 5 : 479. 1836; Qaiser & Abid, l.c. 64. f. 17. A-E.

Annual, branches erect or ascending with soft pubescence. Leaves sessile, linear-oblong, basal leaves slightly obovate, base narrow, entire to serrulate, acute or apiculate. Capitulum heterogamous, radiate, recurved, solitary. Involucre phyllaries 2-3 seriate. Receptacle epaleate. Ray florets pistilate, 3-toothed, 4-7 mm long, deciduous. Disc florets bisexual, fertile, tubular, 5-lobed, c.5 mm long. Cypsela cylindrical or 4-angled, c 1.5 mm long. Outer pappus small forming a crown; inner barbellate, 5 mm long.

Specimen studied: Own-jo-wandio, 17-9-2003, *Zamarrud* 330(KUH); 17-9-2003, *Zamarrud* 343(KUH); Near Kalidas dam, perennial herb upto 1.2 m tall with yellow head, 18-9-2003, *Zamarrud, Adil & Qurban* 352 (KUH) Karanjhar hills, 14-9-2004, *Zamarrud* 551(KUH); Karanjhar hills, 27-3-2005, *Zamarrud* 745(KUH).

Distributed in Pakistan and India.

Ecological note: Found throughout the region.

Flowering period: September – October.

SONCHUS

L. Sp. Pl. 793. 1753; Gen. Pl. 5. 347. 1754.

Annual-perennial herb with fistular stem and shallowly-deeply lobed leaves. Capitula variously arranged homogamous-ligulate. Involucre phyllaries 2-7 serriate; receptacle nacked; florets yellow. Cypcelas wrinkled; pappus many seriate, white, usually connate at the base into a decidous ring.

A genus of c.22 species.

Sonchus asper (L.) Hill, Brit. Herb. 1: 47. 1769; Jafri, l. c. 346. f. 342.

Sonchus oleraceus L., var *asper* L. Sp. Pl. 2: 794. 1753.

Annual, glabrous, 35 cm tall, erect, glandular hairy above, with simple stem. Lower leaves petiolate, upper sessile, blade simple to lobed or pinnatisect, glabrous 8-20 x 1-10 cm, auricles clasping the stem and rounded. Capitula homogamous, radiate, numerous in subcorymbose, white tomentose at the base, peduncle 2-2.5 cm. Involucre with 3-4 seriate phyllaries. Ligule 5-toothed, c. 6 mm, yellow. Cypsela 2-3.5 x 0.5-1 mm, compressed, yellowish brown, usually 3-ribbed on each face, winged, margin serrulate. Pappus 5.5-9 mm, ± deciduous

Specimen studied: Karanjhar hills, 20-3-2003, *Zamarrud* 248 (KUH).

A cosmopolitan weed.

Ecological note: Grows on wet places in association with *Polycarpea corymbosa.*

Flowering period: March - April

VERNONIA

Schreb., Gen. ii : 541. 1791. (*nom cons.*) ; M.D. Dassanayake and F. R. Fosberg, l.c.120.

Herb to shrub, pubescent with alternate, simple leaves. Florets pink or purple, capitula arranged in corymbose cymes or panicles.

A genus of c.350 species found in Irano-Turanian region , Afghanistan, Pakistan, India and Srilanka.

Vernonia cinerascens Schultz-Bip.in Schwein., Fl. Aethop., 162. 1867; Jafri, l.c. 332. f. 323.

Perennial herb, stem woody, hoary, pubescent, erect. Leaves 0.5-1.5 cm x 2-5 mm, sessile or subsessile, oblong, oblanceolate, obtuse or acute, attenuate. Capitula homogamous, discoid, c. 6 mm across.Involucre with many serriate phyllaries. Disc florets many, pink, tubular, 3-3.5 mm long, 5-lobed. Anthers with obtuse base. Cypsela c.3 mm, brown, white hairy, oblong. Pappus persistent hairy, outer shorter than central.

Specimen studied: Karanjhar hills, 20-11-2002, *Zamarrud & Sarwar* 14, 106 (KUH); Karanjhar hills, 20-3-2003, *Zamarrud* 247 (KUH); Near Kalidas dam, rocky plain area, perennial herb upto 1 m tall, 18-9-2003, *Zamarrud* 355 (KUH).

Distributed in India, Pakistan and Tropical Africa.

Ecological note: Grows on rocky hill slopes and sandy plains near seasonal streams with *Acacia senegal, Capparis decidua* and small perennials like *Tephrosia uniflora.*

Flowering period: March – October.

2.3.6. BIGNONIACEAE

Usually shrubs or trees. Leaves opposite, decussate, simple or pinnately compound. Flowers in cymes; large and showy, zygomorphic. Calyx and corolla usually bilipped. Stamens 4, didynamous, epipetlous, disc present. Carpels 2, syncarpous; ovary superior, 2-celled. Fruit usually a capsule. Seeds many, winged.

A family of c. 110 genera and 750 species, distributed in the tropical regions mainly in S. Africa.Following species is found in our region.

TECOMELLA

Seeman, Ann. Mag. Nat. Hist. Ser. 3. 10: 30. 1862; Y. J. Nasir in E. Nasir & Ali, Fl. Pak. 131: 4. 1979.

A monotypic genus, mainly distributed in warmer parts of India, Pakistan, Afghanistan, S. Iran and Arabia.

Tecomella undulata (Roxb.) Seeman, Ann. Mag. Nat. Hist. Ser. 3, 10: 30. 1862; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 46. 1966; Y.J. Nasir, l. c. 5. f. 2. A-G. *Bignonia undulata* Roxb. Fl. Ind. 3: 101.1832.

Fig.13:*Tecomella undulata* growing in association with *Aerva javanica* and *Leptadenia pyrotechnica* in sandy plain.

Trees, upto 5 m tall. Leaves 3.5-9.5 x 0.8-2 cm, lanceolate-elliptic, margin undulate; petiole 6-18 mm long. Inflorscence raceme, condensed. Flowers pedicellate, orange-red. Calyx 12-13 mm long. Corolla lobes suborbicular, 20-25 x 28-32 mm. Stamens c. 38 mm long; staminode 16-17 mm long or absent. Ovary linear. Capsule linear-oblong, slightly curved, beaked, compressed, winged.

Specimen studied: Nagarparkar, sandy desert-Nagarparkar town near Prema village tree c.15 ft tall with orange flowers, 24-3-2005, *Zamarrud & Alam* 688 (KUH).

Distributed in India, Pakistan, Afghanistan, Iran and Arabia.

Ecological note: Grows frequently in sandy plains.

Flowering period: February-September.

2.3.7. BORAGINACEAE

Usually herbs or shrubs rarely trees. Leaves simple, alternate to opposite. Flowers in helicoids and scorpioid cymes. Sepals and petals 5 each. Stamens 5, epipetalous. Carpels 2, syncarpous; style gynobasic or terminal; ovary superior, 4-lobed, 2-celled or 4-celled due to false septum, 1-ovule in each cell. Fruit usually of 4 nutlets.

A family of c.130 genera and c.2300 species distributed world wide, especially in tropics.

KEY TO THE GENERA

1+	Infloresence terminal or axillary scorpoid cyme.....2
-	Infloresence various type but not scorpoid cyme.....3
2+	Stigma capitate or conical, usually with prominent stigmatic ring.....*Heliotropium*
-	Stigma simple or bifid, stigmatic ring absent.....*Arnebia*
3+	Prostrate herbs. Styles 2.....*Coldenia*
-	Shrubs to trees usually erect.Syle 1.....4
4+	Trees or large shrubs. Flowers in spike, raceme or cymes. Fruit a drupe.....*Cordia*
-	Small shrubs.Flowers solitary or in terminal short racemes. Fruit nutlet.....*Trichodesma*

ARNEBIA

Clarke in Hook. f., Fl. Brit. Ind. 4: 176. 1883; Y. J. Nasir in E. Nasir & Ali, Fl. Pak. 191: 65. 1989; Zhu Ge-ling in Harald Riedl &Rodolf Kamelin, Fl. China, 16:344.1995.

A hispid perennial or annual herb with simple, alternate leaves. Flowers in terminal scorpioid cyme, heterostylic.

A genus of c. 25 species, mainly distributed in N. Africa and C and SW. Asia. The following species occurs in our region.

Arnebia hispidissima (Lehm.) A. DC. in DC., Prodr. 10: 94. 1846; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 47. 1966; Y.J. Nasir. l. c. 65. f. 17. I-O.

Lithospermum hispidissima Lehm. Icon. Nov. Strip. 1: 23. t. 39. 1821.

Annual-perennial, upto 30 cm tall.Leaves linear-lanceolate, 4-6 x1-1.5 mm, basal leaves larger. Inflorscence upto 18 cm long. Flowers bright yellow; bracts 4, 4-7.5(-8) mm. Calyx lobes 4-9 mm long, unequal, linear-lanceolate. Corolla lobes 8-11 x 4-6 mm, hairy outside, ovate. Nutlets 1.5-1.7 mm long, ovoid, light brown, minutely tuberculate.

Specimen studied: Kasbo, 17-3-2003, *Zamarrud* 208(KUH); Karanjhar hills, 15-9-2004, *Zamarrud* 567(KUH); Own-jo-wandio, 26-3-2005, *Zamarrud & Alam* 709 (KUH).

Distributed in India, Pakistan, Arabia and Egypt (N and E Africa)

Ecological note: Grows commonly in good drainage soil in association with *Zaleya pentendra, Asphodelus arvensis, Chenopodium murale, Anagalis arvensis* and with large shrubs such as *Sesbania sesban* and *Ziziphus nummularia.*

Flowering period: December-April.

COLDENIA

L . Sp. Pl. 125. 1753; Gen. Pl.5. 561. 1754;Y.J. Nasir, l. c. 18; Zhu Ge-ling in Harald Riedl & Rodolf Kamelin, l.c.337.

Prostrate, branched herb with small leaves. Flowers white or yellow, axillary. Calyx and corolla 4-5 lobed each. Stamens 4-5. Ovary 4-celled with 2 ovules in each. Fruit usually a dry drupe of 4 lobed, 1-seeded pyrenes.

A genus with c.21 species, mainly distributed in tropical and subtropical America.

Coldenia procumbens L., Sp. Pl. 1: 125. 1753; Y.J. Nasir, l. c. 18. f. 5. E-I; Zhu Ge-ling in Harald Riedl & Rodolf Kamelin, l.c.338.

Procumbent herb, upto 35 cm long or more. Leaves subsessile, 10-40 x 5-15 mm, obovate to oblong, pinnatifid, subobtuse; petiole 3-7 mm long. Calyx 4-lobed, lobes obtuse c. 1.2 mm long. Corolla lobes 1-1.5 mm long, obtuse. Drupe pyramidal in shape. Pyrenes beaked, puberulous.

Specimen studied: Budhasar dam, 26-3-2005, *Zamarrud & Alam* 713 (KUH).

Distributed in Srilanka, India, China, Pakistan , Africa, Australia , N and S. America.

Ecological note: Fairly common in the muddy soil near the dams.

Flowering period: March-August

CORDIA

L., Sp. Pl. 190. 1753; Gen. Pl. 5. 84. 1754; Y. J. Nasir, l. c. 5; Zhu Ge-ling in Harald Riedl & Rodolf Kamelin, l.c. 329.

Trees or large shrub with alternate to sub-opposite leaves. Flowers in spike, raceme or cymes. Calyx 3-5 lobed. Corolla 4-5 lobed. Stamens alternate to the lobes or equal, 8.Style twicely divided; ovary simple. Fruit a 1-seeded drupe.

Warmer regions of both the Worlds.

Cordia sinensis Lam., Illust. 1: 423. No. 1914. 1792

Cordia gharaf Ehren b. ex Asch. Sitz-ber. Ges. Naturf. Freunde 1879; Y.J.Nasir, l. c. 6. f. 1. A-E.

Small tree or large shrub, upto 9 m tall. Leaves subopposite, 2-10 x 0.5-4cm, oblong, elliptic, oblanceolate.Inflorescence axillary cymose. Calyx 2.5-3.5mm long, campanulate, pubescent.Corolla 4.5-5 mm long, white, lobes ligulate-obtuse, reflexed. Stamens c.3 mm long; exserted, alternating the lobes. Style terminal,long, 2-forked ; anthers shortly exserted. Ovary ovoid. Drupe ellipsoid with sticky pulp, 1-seeded, rarely more.

Specimen studied: Marvi goath- Nagarparkar, 20-3-2003, *Zamarrud* 241 (KUH).

Species grows in Srilanka, India, Pakistan and Arabia.

Note: *Cordia gharaf* (Forssk .) Ehrenb. ex Asch. has been adopted as a valid name by Jafri(1966); Kazmi(1970); Stewart (1972) and Nasir(1989) .The name was erroneously based on *Cornus graph* Forsskal, Fl. Aegypt-Arab. 95. 1775. Forsskal has never used this name. However, he described this species as *Cornus sangunea* a preoccupied name by L., and graph was reported to be a vernacular name. Heffer & Friis. (1994) have correctly adopted the oldest name of Lamark(1792) which was followed by Wood (1997) and Chauddhry (2001). Lamarck (1792) reported the species from China but not included by Ge-ling et al. (1995) in Flora of China.

Ecological note: Common on the hills slopes and the plains in association with different species such as *Capparis decidua, Cadaba farinosa, Grewia tenax, Prosopis cineraria, Acacia senegal* and *Acacia nilotica*

Flowering period: September-November

HELIOTROPIUM

L., Sp. Pl. 130. 1753; Gen. Pl. 5. 63, 1754;Y.J. Nasir , l. c. 18 ; Zhu Ge-ling in Harald Riedl & Rodolf Kamelin, l.c. 338.

An erect to prostrate, hairy, annual or perennial, herb with alternate, entire leaves. Flowers in terminal or axillary, scorpiod, cymes; bracteate. Ovary 4-celled. Fruit 2-4 nutlets.

A genus of c.276 species, distributed in temperate and tropical regions of both the hemispheres. Seven species are found in Nagarparkar.

KEY TO THE SPECIES

1+	Calyx shallowly 5 lobed, completely covering the fruit.....*H. supinum*
-	Calyx deeply 5-lobed, not completely covering the fruit.....2
2+	Plant completely glabrous with succulent leaves.....
-	.....*H. currassavicum*
	Plant hairy, leaves not succulent.....3
3+	Stigmas 2, linear, recurved, exserted.....*H. ophioglossum*
-	Stigma 1 or minutely bifid or globose, inserted.....4
4+	Flowers bracteate.....*H. strigosum*
-	Flowers ebracteate.....5
5+	Corolla lobes acuminate.....*H. subulatum*
-	Corolla lobes obtuse or acute.....6
6+	Basal stem 10-15 mm thick. Leaf margin revolute, or indistinctly undulate, nutlets with winged margin.....*H. bacciferum*
-	Basal stem upto 5 mm thick. Leaf margin crispy, undulate, nutlets smooth.....*H. crispum*

Heliotropium bacciferum Forssk., Fl. Aegypt-Arab. 38. 1775; Y.J. Nasir, l. c. 43. f. 11, I-N.

Perennial, procumbent herb, 13-15 cm tall. Leaves linear- lanceolate, 2-55 x 1.5-15mm long, stiff hairy, revolute; petiole 1-3.5 cm, densely hairy. Inflorescence 1-2 cm long. Calyx lobes persistent, lanceolate, hairy outside. Corolla white, 5 mm long, tube cylindrical, hairy outside, lobes suborbicular, crenulate to ± undulate. Anthers broad at the base, sometimes 2-fid.Style shorter than stigma.Fruit globose. Nutlets 4, brown, margin winged.

Specimen studied: Nagarparkar, 22-3-2005, *Zamarrud* 657(KUH).

Distributed in Pakistan, Arabia and N. Africa (Egypt).

Ecological note: *H.bacciferum* occurs occasionally in sandy plains of Nagarparkar among the members of cucurbitaceae family.

Flowering period: February- August.

Heliotropium crispum Desf., Fl. Atlant. 1: 151. t. 41. 1798; Y.J. Nasir, l. c. 42. f. 11, E-H.

Perennial herb, upto 48 cm tall, densely hirsute or strigose; stem cylindrical, branched. Leaves simple 1.5-2 x 0.35 cm, lanceolate, sessile, margin crispy, undulate.Inflorescence 2.5-6 cm long. Calyx persistent, lobes ovate-oblong, obtuse, hirsute. Corolla lobes 3.5 mm, undulate. Anthers basifixed, c. 1 mm long. Style erect; stigma conical. Fruit subglobose, of 4- nutlets, smooth.

Specimen studied: Nagarparkar town, 26-3-2005, *Zamarrud* 706 (KUH).

Distributed in Senegal, N. Africa, Arabia, Middle East, India, Pakistan and Afghanistan.

Ecological note: Grows in sandy saline areas.

Flowering period: January-April

Heliotropium curassavicum L., Sp. Pl. 130. 1753; Y.J. Nasir, l. c. 23. f. 6, G-L.

Glabrous, perennial herb, 25-45 cm tall. Leaves succulent 1.2-4 x 0.3-0.8 cm, lanceolate, glabrous. Inflorescence usually with the uniserriate flowers, upto 6 cm long.Calyx persistent, lobes lanceolate, 2-2.5 mm long. Corolla white, glabrous, lobes 1 mm long, obtuse-undulate, tube short. Anthers sessile, 0.6-0.8 cm; stigma conical with prominent ring. Nutlets brown, c. 2 mm long.

Specimen studied: Karanjhar hill, upto 25 cm tall, 17-3-2003, *Zamarrud & Sarwar* 246 (KUH).

Distributed in Pakistan, India, N. Africa and Australia.

Ecological note: Usually grows in sandy saline plains in association with *Cressa cretica* and *Alhagi mororum.*

Flowering period: March-April

Heliotropium ophioglossum Stocks ex. Boiss., Fl. Or 4: 145. 1875; Y.J. Nasir, l. c. 23. f. 6. M-P.

Shrub, upto 45 cm tall; stem erect-suberect, basally branched; branches up to 20 cm long, strigose, intermingled with small hairs. Leaves lanceolate-elliptic, 1-3.3 x 0.6-1.3 cm. Flowers uniserriate, sessile. Calyx lobes ± 3.5 mm long, deciduous, linear-lanceolate, strigose. Corolla white; tube 4 mm long, hairy outside; lobes obtuse-subacute, crenulate. Anthers elongate. Style short; stigma exserted, bifid.Fruit lobed, nutlets 4.

Specimen studied: Karanjhar hill, 20-3-2003, *Zamarrud & Sarwar* 250(KUH).

Endemic to Sindh and Southern Baluchistan.

Ecological note: Occurs on rocky areas frequently with *Senna italica* and *Senna alaxanderina.*

Flowering period: December-March

Heliotropium strigosum Willd., Sp. Pl. 1: 743. 1798; Chaudhri & Chuttar, l. c. 49; Y. J.Nasir, l. c. 25. f. 7. G-L; Zhu Ge-ling in Harald Riedl & Rodolf Kamelin, l.c. 339.

Perennial, 18-28 cm, tall, erect or sometimes procumbent herb; stem appressed hairy. Leaves sessile, linear-lanceolate, 6-30 x 2-4 mm, acute. Inflorescence cymose, helicoids. Flowers bracteate, lower bracts lanceolate, 2x1mm, pedicels upto 2 mm long . Calyx lobes lanceolate, 2.5-3.5x2-3 mm . Corolla lobes yellow, lanceolate.Stigmatic ring prominent. Nutlets 4, dark brown.

Specimen studied: Nagarparkar, *Qaiser, Ghafoor & Abrar Hussain,* 4120(KUH); Nagarparkar plains, 20-3-03, *Zamarrud & Sarwar* 245 (KUH).

Distributed in, India, Myanmar, Pakistan, Neal, Africa, Malaysia and Australia.

Ecological note: Grows occasionally on the sandy plains and the hills.

Flowering period: January-April

Heliotropium subulatum (Hochst. ex DC.) Vatke in Oesterr.Bot. Zeitschr. 25: 166. 1875; Chaudhri & Chuttar, l. c. 50; Y.J. Nasir, l. c. 46. f. 12. A-F.

Perennial herb, 30- 50 cm tall, stem branched, strigose hairy. Leaves lanceolate, elliptic, 1-6 x 0.5-1.5 cm including petiole, undulate. Inflorescence a terminal, cyme. Flowers uniseriate,sessile, campanulate. Calyx lobes 3 x 1.2 mm, lanceolate, hairy outside. Corolla yellow, tube 3-4 mm, lobes 1-5 mm, acuminate. Anthers c.1 mm long. Stigmas narrow, appressed hairy. Nutlets ovoid, brown, 4, 2-2.2 mm long.

Specimen studied: Mithi-Nagarparkar, 26-9-1970, *Qaiser* 3795 (KUH); Karanjhar hills, 19-3-2003, *Zamarrud* 232(KUH).

Distributed in Pakistan, India, and N. Africa.

Ecological note: Species found on the plains along with *Leptadenia pyrotechnica, Aerva javanica* and the grasses and on the hills in association with common shrubs i.e *Cadaba farinosa* and *Capparis decidua.*

Flowering period: November-April.

Heliotropium supinum L., Sp. Pl. 130. 1753; Chaudhri & Chuttar, l. c. 50; Y.J. Nasir, l. c. 21. f. 6 A-F.

Annual, prostrate, upto 20 cm, tall herb. Leaves elliptic 1-2 x 0.5-1 cm, pubescent, greyish white, entire-undulate; petiole upto 15 mm long. Flowers uniseriate, white. Calyx persistent,accrescent in fruit. Corolla lobe, c.3 mm long, hairy outside. Anthers 1 mm, long. Nutlet ovoid, glabrous, enclosed by the calyx.

Specimen studied: Nagararkar, *Abedin, Ali & Farooqi* 4415, 4416(KUH).Nagararkar, 26-9-1970, *Qaiser, Ghafoor & Abrar Hussain* 4080(KUH). Karanjhar hill, upto 15 cm tall, 18-3-2003, *Zamarrud & Sarwar* 227(KUH).

Distributed in India, Pakistan, Arabia, Iraq, Sham,N. Africa and S.Europe.

Ecological note: Grows in fine soil in association with *Cordia sinensis*, *Trichodesma africanum, Boerhaavia repens* and on the hills in association with large shrubs such as *Capparis decidua* and *Cordia sinensis.*

Flowering period: March-April.

TRICHODESMA

R. Br., Prodr. Fl. Nov. Holl. 496. 1810. Nom. Cons: Y. J.Yasin, l. c. 87; Zhu Ge-ling in Harald Riedl &Rodolf Kamelin, l. c. 415.

Perennial herb with hispid hairs. Leaves alternate and opposite. Flowers in terminal, raceme or solitary. Calyx accrescent in fruit. Anthers connivent , apically acuminate. Ovary 4-lobed, style slender. Nutlets glabrous-hairy, smooth-rugose.

A genus of c. 45 species, distributed in tropical and warm regions of the Old world,1 species from our region.

Trichodesma africanum (L.) R. Br., Prodr. Fl. Nov. Holl. 496. 1810; Chaudhri & Chuttar, l. c. 49; Y.J . Nasir, l. c. 90. f. 25. A-C.

Borago africana L., Sp. Pl. 1: 138. 1753.

Annual or biennal herb, 30-60 cm tall, covered with prickly strigose hairs upto 2 mm long. Leaves sessile, simple, alternate, ovate-lanceolate, 1-7 x 0.2-2 cm, strigose hispid. Flowers axillary, solitary; pedicel 1.5 cm long. Calyx lobes 6 mm long, accrescent. Corolla hairy, 15-20 x 3-5 mm bluish-pink, or white blue with yellowish- brown centre.

Anthers elongated, densely hairy. Style slender; stigma obscure. Nutlets 3 mm long, brownish.

Specimen studied: Karanjhar hills, 18-9-2003, *Zamarrud* 363(KUH); Ranpur, 20-3-2003, *Zamarrud* 244(KUH); In sunflower cultivated field in Own-jo-wandio, 26-3-05, *Zamarrud & Alam* 707 (KUH).

Found in India, Pakistan, Afghanistan, Iran,Arabia and N. Africa.

Ecological note: Grows commonly on the plains and the hills among the grasses.

Flowering period: March – September.

2.3.8. BRASSICACEAE (CRUCIFERAE)

Usually annual or perennial herbs with simple or alternate leaves. Flowers in raceme or in corymbs. Sepals and petals 4 each. Stamens 6, tetradynamous. Carpels 2, syncarpous; ovary superior, 2-celled due to false septum. Ovules 1-many. Fruit siliqua.

Family comprises c.350 genera and c. species, distributed in temperate regions especially in the northern hemisphere.

FARSETIA

Turra, Diss. Farsetia, 1. t. 1. 1765; Jafri in Notes Roy. Bot. Gard. Edin.22:209-216.1957; in Nasir. & Ali, Fl. Pak. 55: 108. 1973; O. Appel and I-A. Al-Shehbaz in K. Kubitzki and C.Bayer, Fam.& Gen. Vasc. Pl.5:128.2003.

Diffusely branched.Leaves sessile, linear, oblong. Flowers in loose, ebracteate racemes; short pedicellate. Petals longer than sepals. Ovary 10-40 ovuled, hairy.Fruit siliquae.

A genus of c.10 species, found in S. W. Asia, Central and N. Africa, India and Pakistan.

Farsetia hamiltonii Royle, Illustr. Bot. Himal. 71. 1834; Chaudhri & Chuttar,Veg. Rang. Fl. Thar desert. 69. 1966; Jafri in Notes, Roy. Bot. Gard. l.c. 212. tab.111.f.3;in Fl. Pak.l.c.111. f.12. E-F.

Suffruticose, upto 60 cm tall. Leaves 10-65 x 1-5mm, hairy, acute, entire. Flowers small, pink, orange or orange-whitish; pedicels 2-4 mm. Sepals 3-4 x 1 mm. Petals slightly longer than sepals. Siliquae compressed with narrow ends. Seeds uniseriate, 1-3 mm long.

Specimen studied:Nagarparkar, 26-10-1970, *Qaiser, Ghafoor & Abrar Hussain* 3910(KUH); Nagarparkar, Amminabad goth, 40 cm, tall, woody, Seed 1mm long, 16-9-03, *Zamarrud & Adil* 325 (KUH).

Endemic to the desert areas of India and Pakistan.

Ecological note: Fairly common on sandy wet plains with *Corchorus trilocularis* and *Chloris barbata* while frequently on the hills.

Flowering period: August-September.

2.3.9. BURSERACEAE

Shrubs or trees with resin ducts or aromatic oil. Leaves usually alternate, generally compound or decompound. Flowers solitary or in panicles; uni or bisexual. Sepals 3-6, usually free. Disc annular or cupular or absent. Stamens 3-12. Carpels 2-5, syncarpous; ovary 2-5-celled, each cell 2 or rarely 1-ovuled. Fruit 1-5-seeded berry or drupaceous or hardly dehiscent capsule.

A family of c.17 genera and c.540 species distributed in tropical regions of both the Worlds.

COMMIPHORA

Jacq. Hort. Schoenb. 2. 66. t. 249. 1797; nom. Cons; Abedin & Ali in E.Nasir & Ali, Fl. Pak. 26: 1. 1972.

Shrub or trees with alternate, compound, usually 1-3 foliolate leaves; leaflets sessile-subsessile. Flowers solitary or 2-5 clustered in panicles; uni or bisexual, sessile to short pedicellate. Sepals and petals 4 each. Stamens 8.Ovary ovoid, sessile, 2-4 celled. Fruit a drupe.

A genus comprises c.185 species, found in tropical parts of Pakistan, India, Arabia and Southern Africa. One is from our region.

Commiphora wightii (Arn.) Bhandari in Bull. Bot. Surv. Ind. 6: 327. 1964; Abedin & Ali, l. c. 3. f. 1. J-Q.

Balsamodendron wightii Arn. in Ann. Nat. Hist. 3: 86. 1839; *C. mukul* (Hook. ex Stocks) Engl. in DC. Monogr. Phan. 4: 12. 1883; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert. 51. 1966.

Polygamodioecious shrub, 3-4 m tall, branches knotted, covered with peppery bark. Terminal leaflets 1-5 x 0.5-2.5 cm, glabrous, obovate, serrate; lateral shorter than terminal. Bisexual and male flowers: sessile, red or pinkish white; bracts opposite, glandular hairy. Calyx tubular, glandular hairs outside. Petals reflexed. Stamens 8, rarely 10, free, upto 5 mm long; stigma bilobed. Ovary 2-celled. Fruits mucronate, red at maturity and marked with 2 longitudinal lines. Female flowers: petals longer than sepals. Staminodes 8. Fruit similar to bisexual flowers

Specimen studied: Karanjhar hills mostly at 200-600 altitude, 24-11-2002-2005, *Zamarrud* 42, 43, 334, 514, 678,679 (KUH).

Grows widely in Pakistan, India and Arabia.

Ecological note: Species occurs on the southern slopes of the hills with *Euphorbia caducifolia, Acacia senegal, Cordia sinensis,* and *Grewia tenax.*

Flowering period: September-March

2.3.10. CAPPARACEAE

Usually herbs to trees with simple or compound, alternate, stipulate leaves. Flower solitary or in axillary raceme; zygomorphic. Sepals usually 4. Petals usually 4, free, 2-petals large. Stamens 4-many, sometimes with androphore. Carpels 2, syncarpous, ovary superior with gynophore, 1-celled, many ovuled. Fruit a capsule or berry.

A family of c. 45 genera and c.600 species, distributed in tropical and subtropical regions of the world. One from our region.

KEY TO THE GENERA

1+	Androphore and Gynophore present.....2
-	Gynophore present.....3
2+	Leaves alternate, simple or palmately lobed.....*Cadaba*
-	Leaves 3-7 foliolate.....*Gynandropsis*
3+	Small tree or shrub, spiny.....*Capparis*
-	Annual or perennial herbs, usually not spiny.....*Cleome*

CADABA

Forssk., Fl. Aegypt- Arab., 67. 1775; Jafri in E.Nasir & Ali, Fl. Pak. 34: 11. 1973; L. E. Kers in K. Kubitzki and C. Bayer, Fam.& Gen. Vasc. Pl.5: 53. 2003.

Annual or perennial herb with petiolate, simple or plamately lobed leaves. Flowers in bracteate or sometimes ebracteate raceme. Flowers small, usually pedicellate. Sepals and petals 4 each. Androphore and gynophore present.Stamens 4-12, free. Fruit a capsule with many seeds.

A genus of c. 200 species, distributed in the tropical and subtropical parts of the world. Only 10 species are found in Pakistan. One is found in our region.

Cadaba farinosa Forssk., Fl. Aegypt. – Arab., 68. 1775; Jafri, l.c., 12.

subsp. ***farinosa*** f. 3.B.

Much branched shrub upto 5 m high; branches slender. Leaves oblong-ovate 4-50 x 2-30 mm, rounded at the apex; petiole 2.5-5 mm long. Flowers usually 5–10, arranged in subcorymbose raceme. Sepals: outer oblong–ovate, 4–14 mm long, acute, scaly; inner flatish, less acute. Petals elliptic – oblong, 9–14 x 2–4 mm long. Androphore 5–8 mm long. Stamens usually 5, rarely 4. Gynophore upto 15 mm long. Fruit 20–50 x 3 – 4 mm, narrowly cylindrical. Seeds 2.5 mm across, covered with orange flesh.

Species found in India, Pakistan, Arabia, Egypt and Tropical Africa.

Specimen studied: Karanjhar hills, 14-9-2004, *Zamarrud* 540 (KUH).

Ecological note: Common on the hills slopes with *Capparis decidua, Euphorbia caducifolia* and *Commiphora wightii.*

Flowering period: March–September.

CAPPARIS

L., Sp. Pl. 503. 1753; Gen. Pl. 5.222. 1754; Jafri, l. c. 4; L. E. Kers, l.c.50.

Shrub, climber or small trees. Leafless or present only on young twigs (in ours). Flowers solitary, axillary or in terminal raceme, corymb; bracteate but caducous. Sepals and petals 4-5 each. Stamens 5-20, often indefinite. Gynophore as long as stamens. Ovary with 2-10 ovules. Fruit berry with few to many seeds.

A genus of c. 250 species, distributed in the tropics and subtropics of both the hemispheres and 1 species is reported from the study area.

Capparis decidua (Forssk.) Edgew. in J. Linn. Soc. Bot., 6: 184. 1862; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert. 54. 1966; Jafri, l. c. 11.

Sodada decidua Forssk., Fl. Aegypt-Arab. 81 .1775.

Fig. 14:*Capparis decidua*: Flower

Small tree or shrub, upto 5 m tall with spiny branches. Leaves appear on young twigs, linear,caducous, 4-20 x 1-3 mm, apex spiny; subsessile; stipules 1-6 mm long. Inflorescence corymbose with few to many flowered, ebracteate. Flowers brick-red, yellowish orange or pink, pedicellate. Sepals 5-8 x 3-5 mm, ovate-oblong. Petals equal to sepal. Stamens 10-15. Gynophore 10-15 mm long. Ovary 2 mm across. Fruit rounded, 10-15 mm across, red, glabrous. Seeds 2-5 mm in diameter.

Specimen studied: Budhaser, 26-10-1970, *Qaiser & Abrar Hussain* 4103 (KUH); Karanjhar hills , 14-9-2004, *Zamarrud* 541 (KUH).

Distributed in India, Pakistan, Arabia , Egypt and N. Tropical Africa.

Ecological note: Species grows throughout the regions, often with *Cadaba farinosa* and *Euphorbia caducifolia* on the hills.

Flowering period: February- September.

CLEOME

L. Sp. Pl. 671. 1753; Gen. Pl.5.302. 1754; Jafri, l. c. 20; L. E. Kers, l.c.48.

Annual to perennial herb. Leaves alternate , simple or lobed . Flowers in bracteate or ebracteate racemes; small or mediocre. Sepals and petals 4 each. Androphore and gynophore present, sometimes absent. Stamens 4-12, free. Capsule with many seeded.

A genus of c. 200 species, distributed in the tropical and subtropical parts of the world. Only 2 species are reported from the study area.

KEY TO THE SPECIES

1+	Leaflets 2-8 mm broad.Stamens 6.....*C. brachycarpa*
-	Leaflets 5-25 mm broad. Stamens 10-12.....*C. viscosa*

Cleome brachycarpa Vahl ex DC., Prodr., I: 240. 1824; Chaudhri & Chuttar, l. c. 55; Jafri, l. c. 23. f. 4. F-G.

Annual or perennial, 35-50 cm tall; stem base often woody, sometimes decumbent, branched, pubescent. Leaves sessile-petiolate, simple, 3-5 foliolate; leaflets 5-20 x 2-8 mm, linear-lanceolate or oblong. Flowers yellow, bracteate; pedicel filiform. Sepals 2-3 x 1 mm, elliptic-lanceolate, hairy. Petals twice the length of sepals. Stamens 6. Gynophore 1 mm long, inconspicuous. Fruit oblong with dense, glandular hair. Seeds reddish-brown.

Specimen studied: Karanjhar hills, 16-9-2004, *Zamarrud* 578 (KUH).

Species found in Tropical and N. Africa and most parts of the Asia.

Ecological note: Species occurs at foot hills and the plains in association with *Digera muricata, Justicia vahlii, Boerhaavia repens* and *Gynandropsis gynandra.*

Flowering period: March-September

Cleome viscosa L., Sp. Pl. 672. 1753; Jafri, l. c., 23.

C. icosandra L., Sp. Pl., 938. 1753.

Annual, herb, 15-40 cm tall with and without glandular hairs. Leaves 3-5 foliate, leaflets elliptic, oblanceolate, obovate, 0.5-4 x 0.5-2.5 cm, middle longer than lateral. Inflorscence elongated racemes, bracteate. Flowers c. 15 mm in diameter, yellow to white; pedicels 6-20 mm long; bracts foliaceous. Sepals oblong-lanceolate, 3-6 x 1-2 mm, hairy. Petals 8-15 x 2-4 mm, oblong-obovate. Stamens 10-12, smaller than petals. Fruits 30-75 x 3-5 mm, linear-oblong, erect, obliquely striate.

Specimen studied:Nagarparkar, near Karanjhar hill, c. 25 cm tall, herb, 27-3-2005, *Zamarrud* 745 (KUH).

Common species of tropical regions.

Ecological note: Found in the plains and at the foot hills during the monsoon in association with *Digera muricata, Justicia vahlii, Boerhaavia repens* and *Gynandropsis gynandra.*

Flowering period: March-August.

GYNANDROPSIS

DC., Prodr. 1: 237. 1824; Jafri, l. c., 17.

Annual or perennial herb with 3-7 foliate leaves. Flowers in terminal raceme with foliacious bracts; pedicellate. Sepals and petals 4 each. Androphore as long as the gynophore, with 10 stamens. Fruit a dehiscing capsule.

A small genus comprising c.2 species, one is reported from our region.

Gynandropsis gynandra (L.) Briq in Ann. Conserve. Jard. Bot. Geneve, 17: 382.1914; Jafri, l. c. 20.

Cleoma gynandra L., Sp. Pl., 671. 1753

Annual, upto 90 cm tall, herb; stem sometimes suberect, glandular hairy. Leaves 3-7 foliolate; leaflets 1-6 x 0.5-3 cm, elliptic, acute or acuminate, crenate, or subentire;petiole 1-10 cm long. Inflorescence ±30 cm long. Flowers white to pink, pedicelate; bracts small. Sepals ovate-lanceolate, 2-8 mm long. Petals double the length of sepals. Androphore 15-25 mm long. Ggynophore 8-20 mm long. Capsule linear. Seeds dark brown, 1-1.8 mm, across.

Specimen studied: Nagarparkar plains, 29-3-2005, *Zamarrud* 760 (KUH).

Species found commonly in tropical and subtropical regions.

Ecological note: Grows abundantly during monsoon on the plains and the slopes of the hills with *Digera muricata, Justicia vahlii* and *Boerhaavia repens.*

Flowering period: March-July.

2.3.11. CARYOPHYLLACEAE

Annual or perennial herbs. Leaves simple usually opposite. Flowers in cymes or rarely solitary. Sepals and petals 5 or 4 each, free. Stamens equal or twice the number of petals. Carpels 2-5, syncarpous; ovary usually 1-celled, many ovuled. Fruit a capsule.

A family of c. 90 genera and c.2300 species, mainly distributed in temperate and warm N. hemispheres. Reported by the following genus in our area.

POLYCARPEA

Lam. in Journ. Hist . Nat. Par. 2:3, t. 25. 1792; Ghaznafar & Y.J. Nasir in E.Nasir & Ali, Fl. Pak. 174: 51. 1986; V.Bittrich in K.Kubitzki, Fam. & Gen.Vasc. Pl. 2: 221. 1993.

Leaves usually linear to ovate with scarious stipules. Sepals usually longer than petals.Capsule 3-valved.

A genus consisting c. 50 tropical and subtropical species. Represented by the following species in our area.

Polycarpea corymbosa (L.) Lam., Ill. Gen. Encycl. 2: 129. 1797; Ghaznafar & Y.J. Nasir, l.c. 52.

Achyranthus corymbosa L., Sp. Pl. 205. 1753.

Stoliniferus annual, herb, 15-30 cm tall , hairy at the base, velvety, pale white; stem dark brown. Leaves 1.6 x 0.5 cm, simple, linear, opposite sometimes in whorl, entire, acute. Flowers in branched cyme; Sepals pale white, silvery, elliptic, acute, 3-3.5 x 3 x 1 mm. Petals orbicular, lanceolate. Stamens 5. Style 3-lobed.Fruit brown. Seeds kidney- like, smooth.

Specimen studied:Near Kalidas dam, sandy plains, 17-9-2003, *Zamarrud* 334 (KUH).

Distributed in Tropical parts of Africa, Australia, Asia and America, rarely found lower and upper Indus plains of Pakistan.

Ecological note: Common in sandy plains near water beds.

Flowering period: August–September

2.3.12. CELASTRACEAE

Trees, shrubs or climbers. Leaves stipulate, simple, opposite or alternate. Flowers in cyme; bisexual or unisexual. Sepals 4-5, inserted on a disc. Petals 4-5, inserted below the disc or so. Stamens 3-5, free, inserted on the disc, alternating with patals. Carpels 2-5, syncarpous; ovary superior, 2-5 celled, each cell usually 2-ovuled. Fruit capsule, berry or drupe. Seeds usually endospermic.

A family of c. 90 genera and 1300 species, distributed in tropical and subtropical areas.

MAYTENUS

Molina, Saggio Chile, 177. 1782; Siddiqi in E. Nasir & Ali,Fl. Pak. 109: 9. 1977.

Small trees, usually spiny with alternate, ex-stipulate leaves. Flowers in axillary, fasciculate cymes. Ovary 2-3 celled, 2-ovuled each. Fruit turbinate or rarely globose. Seeds arillate.

This genus comprises c. 200 species, distributed in the tropical and subtropical Africa, Asia and Australia. Represented in Nagarparkar by 1 species.

Maytenus senegalensis (Lam.) Excll in Bot. Sot. Brot. Ser. 2, 26: 223. 1952; Siddiqi, l. c. 11. f. 2. F-I.

Celastrus senegalensis Lam., Encyl. Meth. Bot. 1: 661. 1785.

A small sized, spiny tree or large shrub, with thin, grey bark. Leaves glabrous, obovate, oblanceolate, linear-spatulate, 1-5 x 0.4-3 cm. Flowers small in axillary, dichotomous or fasiculate, cyme on short branchlets; bracts lanceolate. Sepals elliptic-oblong, ciliate.Petals oblong. Style 2-3 lobed; ovary glabrous, orbicular.Capsule globose, bivalent, purple. Seeds chestnut, brown-orange.

Specimen studied: Nagarparkar at Maya dam side, near godam 24-11-2002, *Zamarrud & Sarwar* 85 (KUH); Sandy plains, 15-9-2003, *Zamarrud* 321(KUH).

Distributed in Tropical and subtropical regions of Asia and Africa.

Ecological note: Found rarely on the plains.

Flowering period: February-September.

2.3.13. CHENOPODIACEAE

Usually halophytic, annual or perennial herb with fleshy stems. Leaves usually alternate, simple and fleshy. Flowers in spike, racemes or panicle cyme; bisexual or unisexual. Sepals usually 5. Petals absent. Stamens usually many. Carpels 2-3, syncarpous; ovary mostly superior, 1-celled, 1-ovuled. Fruit a nutlet.

A cosmopolitan family but mainly in desert and semidesert areas. It is represented by more than 100 genera and c.1300 species. Represented by 4 genera and 5 species including one cultivated species in our area.

KEY TO THE GENERA

1+	Cultivated herb. Dioecious.....*Spinacea*
-	Wild herb. Plant with bisexual flowers.....2
2+	Perianth winged.....*Salsola*
-	Perianth not winged.....3
3+	Leaves large,flat, petiolate.....*Chenopodium*
-	Leaves small, terete, succulent, sessile.....*Suaeda*

CHENOPODIUM

L., Sp. Pl. 218. 1753; Gen. Pl. 5.103 . 1754; U. Kuhn in K.Kubitzki, Fam. & Gen. Vasc. Pl. 11: 253. 1993; Uotila in Ali & Qaiser, Fl. Pak. 204: 13. 2001.

Annual or short-lived perennial, herbs with angular stem and alternate, petiolate leaves. Flowers small in spike-like panicles, cymes or clustered; ebracteate, sessile, perianth segments usually 5, free or united. Stamens usually 5, free or connate at the base. Fruit depressed-globular.

A genus of c. 150 species distributed throughout the world, mainly in subtropical and tropical regions. The following species is found in the study area.

Chenopodium murale L., Sp. Pl. 219. 1753; Uotila, l.c. 26. f. 4. E-H_1.

Annual, 10-60 cm long; stem yellowish green, striped, hairy-glabrous. Leaves olive green, lanceolate, elliptic, ovate, dentate 2-5 x 1-2 cm; petiole 1-3 cm. Inflorescence terminal, axillary, leafy cyme. Flowers usually female or bisexual. Perianth segments 5, connate. Ovary 1-celled. Fruits nutlets, pericarp papillose. Seeds black, margins acutely keeled.

Specimen studied: Own jo-wandio, 26-3-2005, *Zamarrud & Alam* 722 (KUH).

Distributed in S and S. W. Asia to N. Africa., C. and S. Europe.Introduced in other parts of the world.

Ecological note: During the monsoon period plant grows abundantly in association with *Amaranthus viridis* in the plains and foot hills.

Flowering period: March – April.

SPINACEA

L., Sp. Pl. 1027. 1753; Gen. Pl. 5. 452.1754

Dioecious, annual-perennial with pinnatifid or pinnatisect leaves. Flowers in sessile clusters, male in spikes or panicles and female in axillary clusters. Female flowers: perianth segments absent, bracteate, 2-bracts connate around ovary and accriscent in fruit, each dorsally spiny. Male flowers: perianth segments 2, stamens 4-5 each. Fruit indehiscent, usually spiny with vertical seeds.

A small genus comprises c.3 species, found in central and west Asia.

Spinacea oleracea L., Sp. Pl. 1027. 1757; Freitag in Ali & Qaiser, Fl. Pak. 204. 52. 2001.

Annual or biennial 20-60 cm tall, dioecious herb.Leaves triangular-hastate entire, basal leaves entire with long petiole. Male flowers with 4 rarely 5 perianth segments and stamens. Female flowers without perianth segments arranged in dense, axillary, sessile, clusters. Fruit nutlet. Seeds vertical.

Specimen studied:Own-jo-wandio, erect herb upto 20 cm tall, 26-3-2005, *Zamarrud* 718a, 718b, 718c (KUH); Kasbo, 26-3-2005, *Zamarrud* 721 (KUH).

Probably originated from *S. tetrandra* Stev. in W. Asia, cultivated in warmer parts of Asia.

Ecological note: Cultivated in Nagarparkar town, Kasbo and Own -jo-wandio and also found as an escape in less saline sandy areas.

Flowering period: March - September

SALSOLA

L., Sp. Pl. ed. 1: 222. 1753; Gen. Pl. 5.104. 1754; Freitag, l. c. 127.

Herb-shrub, sometimes small trees with small, succulent, sessile, opposite or alternate leaves. Flowers in solitary, axillary or clustered in loose or dense spike; bracteate. Perianth segments 5 rarely 4. scarious, developing a prominent transverse wing in fruit. Stamens 5(-4), staminodes rarely present.Ovary globose. Fruit utricle.

A genus of c. 100 species, mainly distributed in the Old world.

Salsola imbricata Forssk., Fl. Aegypt-Arab. 57. 1775; Freitag, l. c. 157. f. 28. E.

Salsola baryosma (Roem. And Schult.) Dandy in F.W. Andrews, Fl. Pl. Anglo-Egypt Sudan, i:111. 1950;Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert , 57. 1966.

Shrublet, 0.3-2 m tall, stem covered with curved, warty to 1.5 mm long, hairs, glabrescent. Nodulated, densely branched above. Flowers with ± leaf –like bracts; bracteoles 2. Perianth segments 5, free, ovate-ligulate, 1-2 x 0.8-1.8 mm. Stamens 5, antitepalous. Ovary globose or depressed. Fruit with persistent, equal, perianth segments silky. Seeds semiglobular.

Specimen studied: Cultivated fields in Kasbo, 23-9-2005, *Zamarrud* 831(KUH).

Distributed in India, Pakistan, Afghanistan, Iran, Arabia, Africa, W. and S. W. countries. Throughout the hot parts of the world.

Ecological note: Grows in saline areas in association with *Cressa cretica, Salvadora oleoides* and *Suaeda fruticosa.*

Flowering Period: August-October

SUAEDA

Forssk., Fl. Egypt-Arab. 70. 1775; Freitag *et al.*, l. c. 104.

Herb to shrub with and alternate, terete, lenticular, subsessile-sessile leaves. Flowers in terminal spike or solitary; bracteate. Perianth segments 5 herbaceous or succulent. Male flowers: stamens 5. Female flowers: style short or absent; stigmas 2-3 (-5); ovary sessile, free. Fruit vertical or oblique with thin papery pericarp.

A genus of 80-90 species, mainly distributed in sandy coastal desert of extra-tropical parts of the world.

Suaeda fruticosa Forssk. ex. J. F. Gmelin in L., Syst. Nat. 13, 2: 503. 1791; Chaudhri & Chuttar, l.c. 58; Freitag, et al., l. c. 107. f. 20. A. 21.

Shrublet, 0.5-2, tall, rarely prostrate mats, branches drying black; stem imbricately branched. Leaves sessile, succulent, linear, terete or oblong and flat, 0.5-2 x 0.1-3 cm. Inflorescence terminal, simple or branched spike. Flowers bisexual and female. Bisexual flowers: perianth segments 5, connate 1/3, succulent.Stamens 5. Ovary ovoid, pear-shaped, truncate above. Seeds horizontal. Female flowers: ovoid to ellipsoid, short, connate half way, nonsucculent. Ovary cylindrical. Seeds vertical or oblique, smooth, shining black.

Specimen studied: Near Rann of Kutch, salt range, 19-3-2003, *Zamarrud* 238 (KUH); 22-9-2005, *Zamarrud* 824(KUH).

Found from Cape Verde Islands to North Africa, Arabia, Iran, Afghanistan, Pakistan, India to Srilanka.

Ecological note: Common in saline soil.

Flowering period: September – January.

2.3.14. CONVOLVULACEAE

Herbs, shrubs or small trees, sometimes erect or prostrate. Leaves simple, alternate or compound. Flowers in cymes or solitary; actinomorphic or zygomorphic. Sepals 5, free, persistent. Petals 5, connate. Stamens 5, epipetalous. Carpels 2, syncarpous; ovary superior usually 2-4-celled, each cell 2-ovuled. Fruit loculicidal capsule.

A cosmopolitan family, consists of c. 60 genera and c.1600 species, mainly distributed in temperate regions

KEY TO THE GENERA

1+	Leaves simple with entire margin.....2
-	Leaves divided or palmately compound.....6
2+	Medifixed hairs present.....*Seddera*
-	Basifixed hairs present.....3
3+	Style 1.....5
-	Styles 2.....4
4+	Flowers blue, corolla limb pilose outside, stigmas long terete or filiform.....*Evolvulus*
-	Flowers white, corolla limb glabrous outside, stigma large capitate.....*Cressa*
5+	Large twining shrub. Leaves cordate to semicordate. Fruit indehisent.....*Rivea*
-	Small prostrate perennial. Leaves linear to ovate. Fruit dehiscent.....*Convolvulus*
6+	Anthers straight.....7
-	Anthers twisted.....*Meremmia*
7+	Stigmas linear, pollen 3-4 colpate, smooth.....*Convolvulus*
-	Stigmas capitate, pollen panto porate, spiny.....*Ipomoea*

CONVOLVULUS

L., Sp. Pl. 153. 1753;Gen. Pl.5.76.1754;Ghazanfar in E. Nasir & Ali, Fl. Pak. 126: 7. 1979; Fang Rhui-cheng & George Staples, Fl. China. 16: 289. 1995.

Herb to shrub, climber, prostrate, branches occasionally spiny. Leaves alternate, simple, entire or lobed. Flowers in terminal or axillary cyme or solitary. Style single, stigma filiform. Capsule glabrous or hairy, 1-4 seeded. Pollen 3-4 colpate, smooth.

A genus of c.100 species, distributed throughout the world especially in temperate regions. Only 1 species occurs in the area.

Convolvulus prostratus Forssk., Fl. Aegypt. Arab. 203. 1775; Ghazanfar, l. c. 23. f. 3, D-G.

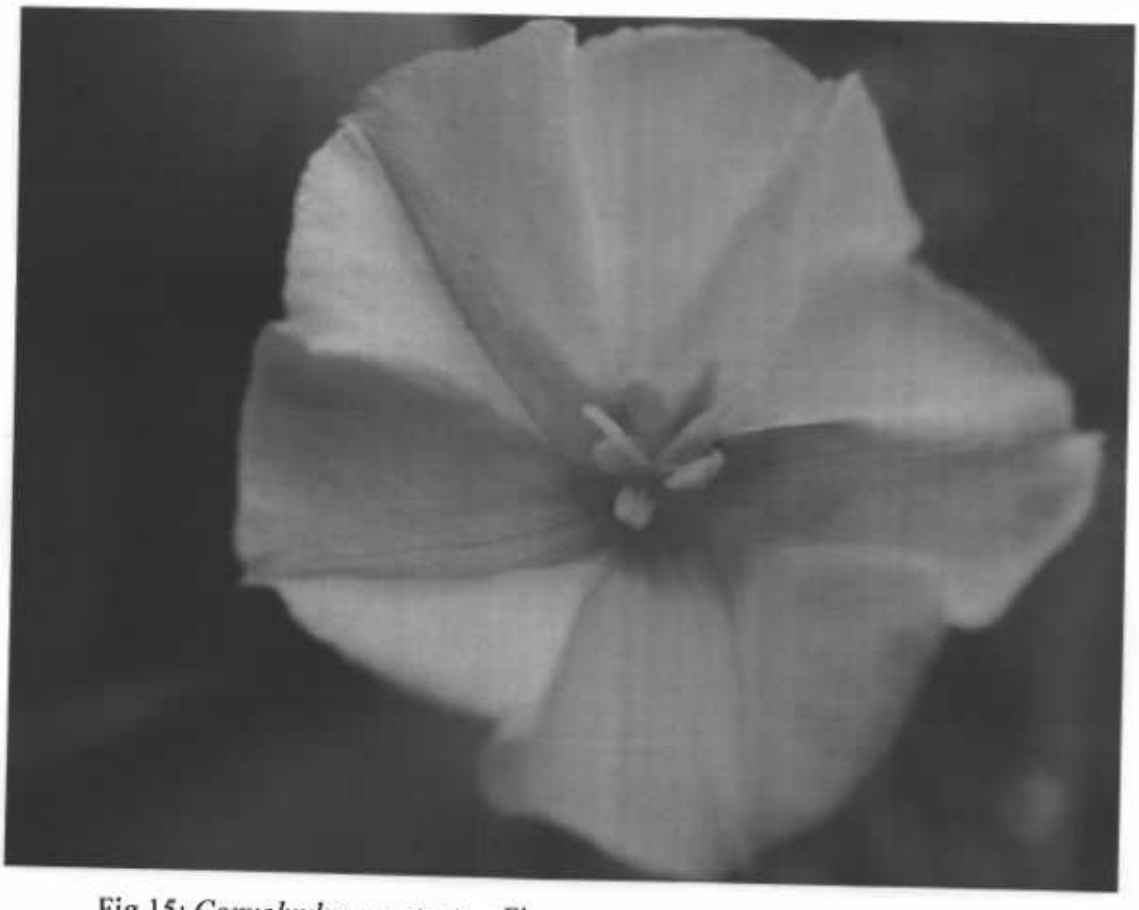


Fig.15: *Convolvulus prostratus*: Flower

Perennial herb, 5-30 cm long, procumbent; from the base, rugose - fulvous, tomentose. Leaves sessile, 4-16 x 2-6 mm, linear, oblong, oblanceolate to lanceolate, subacute – obtuse. Flowers 1-5, sessile in axillary head; bracts linear, hirsute,oblanceolate. Sepals 3-7 mm long. Petals double the sepals length. Stigmas 2, longer than style. ovary subglobose, 2-celled. Fruit 2-4 seeded, 3mm across. Seeds brown-black, densely white pubescent.

Specimen studied: Karanjhar hills, 24-11-2002, *Zamarrud* 28(KUH); Kasbo, 15-9-2003, *Zamarrud* 314(KUH); Salamkot desert near Ammina abad, 15-9-2003, *Zamarrud* 317 (KUH).

Species distributed from Egypt to India through Iran and Pakistan.

Ecological note: Commonly on sandy plains with *Crotalaria burhia, Cenchrus biflorus* and *Chloris barbata.*

Flowering period: January-September

CRESSA

L. Sp. Pl. 223. 1753; Gen. Pl.5.104.1754; Austin in E.Nasir & Ali. l. c. 30; M.D. Dassanayake & F. R. Fosberg in M.D. Dassanayake, Fl. Cey (rev.). 1:303. 1980.

Much branched, undershrub with small, sessile, entire leaves. Flowers small, sessile, bracteate,clustered at the terminal.Calyx and corolla infundibuliform. Styles 2, free from the base; stigma capitate. Capsule 2-4 valved. Seeds 2 or 4.

A genus of c.3 species, found in the warmer regions. Only 1 species is known from Nagarparkar.

Cressa cretica L., Sp. Pl. 1: 223. 1753; Austin, 30. f. 4. J-K.

Erect, dwarf, shrublet, pilose. Leaves closely arranged, sessile, ovate, lanceolate, lanceolate–ovate, 2.5-9 x 1-6 mm subcordate, entire. Flowers terminal, cluster, subsessile, white. Calyx lobes ovoid, 2.5-4 mm long, hairy outside. Corolla lobes 3.5-6 mm long, tube oblong, ovate. Stamens exserted. Stigma subclavate or linear; ovary 2-celled, 4 ovuled. Fruits capsuler, ovoid, 3-4 mm long, 1-seeded.

Specimen studied: Nagarparkar, throughout sandy – hilly region, 18-11-2002-20-9-2005, *Zamarrud* 04,132,224, 811 (KUH).

Commonly found in the xeric tropical and sub tropical zones of both the hemispheres.

Ecological note: Occurs in saline areas.lowering period: All round the year.

EVOLVULUS

L., Sp. Pl. ed. 2: 391. 1762; Gen. Pl.5.104.1754. Austin, l. c. 32; Fang Rhui-cheng & George Staples, l.c. 275.

Annual or low perennial, prostrate, herb with usually small, almost linear, entire leaves. Flowers in axillary, pedunculate cymes.Sepals free. Styles 2; stigma long terete. Fruit capsular, globose to ovoid. Seeds small.

A genus of c. 100 species, mostly endemic to the New World. The only one American species naturelized in Asia, also occurs in Nagarparkar.

Evolvulus alsinoides (L.) L., Sp. Pl. ed.2 : 392. 1762; Austin , l. c. 32.f.5. A-B; M.D. Dassanayake & F. R. Fosberg,l.c. 309; Fang Rhui-cheng & George Staples, l.c. 276.

Convolvulus alsinoides L., Sp. Pl . 1: 157. 1753.

Annual, ascending, herb, pubescent. Leaves subsessile, acute, pubescent. Flowers solitary or sometimes 2 on very long, filiform peduncles, c. 1 cm across. Sepals lanceolate, acute, 1.5-3 mm long. Corolla blue, infundibular. Styles with 2-cleft. Seeds black.

Specimen studied: Karanjhar hills, 24-10-70, *Qaiser, Ghafoor & Abrar Hussain* 3964 (KUH) Near Kalidas dam, 23-9-2003, *Zamarrud* 411(KUH).

Species found in most tropical and subtropical countries.

Ecological note: A rare species, grows near water channels among *Chloris barbata, Pedalium murex*, and other annuals, often it is found in the protection of *Prosopis cineraria.*

Flowering period: February-October.

IPOMOEA

L. Sp. Pl. 159. 1753; Gen. Pl. 5. 419.1754; Austin , l.c.34; M.D. Dassanayake & F. R. Fosberg, l.c.313 ; Fang Rhui-cheng & George Staples, l.c. 301.

Aquatic shrub , climber or twiner.Flowers usually in axillary cyme, rarely paniculate. Corolla zygomorphic.Stamens unequal. Style one, filiform with simple or 2-lobed, capitate stigma; ovary usually 2-celled. Capsule 4-6 seeded, usually dehiscent.

A genus of c. 500 species, distributed throughout the tropics and subtropics of both the hemispheres. Five species are represented from our region.

KEY TO THE SPECIES

1+	Plants aquatic.....*I. aquatica*
-	Plants teresterial.....2
2+	Sepals, peduncles and pedicels with retrose trichomes. Stigma 3-lobed.Ovary 3-4-celled.....3
-	Glabrous or atleast trichomes not retrose.....4
3+	Flowers solitary or in cymes. Corolla 3-5 cm long.....*I. nil*
-	Flowers in capitate or sub capitate head. Corolla 7-8 mm long.....*I. eriocapa.*
4+	Leaves stipulate, palmately divided to the base.....*I. carica*
-	Leaves exstipulate, entire to lobed but never palmately divided to the base.....*I. tricolor*

Ipomoea aquatica Forssk., Fl. Aegypt. Arab. 44. 1775; Austin, l.c., 38. f. 5. C-D; M.D. Dassanayake & F. R. Fosberg, l.c. 318; Fang Rhui-cheng & George Staples, l.c. 307.

Aquatic, annual, with trailing, hollow stem. Leaves cordate, hastate, terminal lobe, triangular or lanceolate, basal lobes absent sometimes present, acute, obtuse. Flowers purple, solitary or few arranged in cyme. Sepals upto 7 mm long, ovate-oblong, glabrous. Petals upto 5 cm long. Fruit globose, 2-4 seeded.

Specimen studied: Kasbo, 20-9-2003, *Zamarrud* 387(KUH); Karanjhar hills, 24-3-05, *Zamarrud* 686(KUH); Adagam, 22-3-05, *Zamarrud* 586(KUH)

Widely distributed species.

Ecological note: Grows in marshy area.

Flowering period: Usually all the year round.

Ipomoea cairica (L.) Sweet, Hort. Brit. 287. 1827; Austin, l. c. 40. f. 5. G-I; M.D. Dassanayake & F. R. Fosberg, l. c.322 ; Fang Rhui-cheng & George Staples, l.c. 309.

Perennial, climber with tuberous root.Stem hairy.Leaves petiolate, palmately 5 lobed to the base, orbicular or ovate in outline, 3-10 cm long. Flowers in cymes; purple or pink. Sepals ovate, 4-6.5 mm long.Corolla funnel shaped, 0.8-1.5 cm long. Fruit ± globose or ovoid. Seeds densely hairy.

Specimen studied: Nagarparkar, Karanjhar hills, 20-3-2003, *Zamarrud* 251(KUH).

Railway creeper is a native of America. Introduced in Asia and Africa where it is widely cultivated for ornamental purposes, also grows as an escape.

Ecological note: Species grows abundantly on sandy plains usually in association with *Acacia nilotica*

Ipomoea eriocarpa R. Br., Prodr. 484. 1810; Austin, l. c. 41. f. 6. A-B; M.D. Dassanayake & F. R. Fosberg, l.c. 325; Fang Rhui-cheng & George Staples, l.c. 303.

Perennial, prostrate, herb covered with dense, pilose hairs. Leaves broad, ovate or lanceolate-ovate, 2-4 cm long, attenuate-acute at the apex, cordate at the base, pubescent, ciliate. Flowers axillary, short peduncled. Sepals linear, acuminate, 6 mm long, pilose.

Corolla tubular, 7-8 mm long, pink or purple. Capsule globular. Seeds black glabrous, minutely reticulate.

Specimen studied: Karanjhar hills, 24-3-05, *Zamarrud* 671(KUH).

Species found in Tropical Africa, Pakistan, India and Malaysia to N Australia.

Ecological note: Grows at foot hills in association with *Ipomoea nil* and *Enicostemma hyssopifolium*

Flowering period: March- October

Ipomoea nil (L.) Roth, Cat. Bot. 1: 36. 1797; Austin, l. c. 45. f. 6. C-D; M.D. Dassanayake & F. R. Fosberg, l. c.332; Fang Rhui-cheng & George Staples, l.c. 305.

Annual, decumbent herb, upto 20 cm tall; stem angular, pubescent with long trichomes. Leaves ovate, trilobed-suborbicular, 5.5-15 cm long, entire, acute, central lobe acuminate, cordate, pubescent ,dense below, scattered above; petiole 3-8 cm long, hairy. Flowers purple or pink, solitary or in cymes. Sepals long lanceolate with curved apex, entire, hairy outside. Corolla blue or purple, throats light pink or white, 3-5 cm long. Fruits subglobose to globose, 8-12 mm long. Seeds pyriform, densely pubescent.

Specimen studied: Karanjhar hill, 24-3-05, *Zamarrud & Alam* 666(KUH).

Originally from Americas, now circumtropical in distribution.

Ecological note: Grows at foot hills under the microclimate of *Prosopis juliflora* and *Euphorbia caducifolia* and with many annuals.

Ipomoea tricolor Cav., Icon. Descr. Pl. 3: 5. t. 208. 1794; Austin, l. c. 49.

Perennial, climber, rounded stem, glabrous to soft minute hairy. Leaves ovate 3-7 x 2-6 cm, acuminate, cordate-saggitate, dentate. Flowers in axillary cyme. Sepals ovate-lanceolate, 4-6 mm long, brown, scarious, pale white. Corolla 4-6 cm long, tubular, blue.Capsule ovoid, mucronate. Seeds blackish brown, minutely pubescent, 4-5 mm long.

Specimen studied: Nagarparkar, 18-9-03, *Zamarrud* 373 (KUH); Nagarparkar hills, 25-3-2005, *Zamarrud* 694(KUH).

In Nagarparkar grows wildly; cultivated else where.

Ecological note: Grows rarely on the plains, climbing on *Capparis decidua* and *Acacia senegal*..

Flowering period: March-November

MERREMIA

Dennstedt, Schluss. Hort. Malab. 34. 1818; Austin, l.c. 52; M.D. Dassanayake and F. R. Fosberg,l.c.346; Fang Rhui-cheng & George Staples, l.c. 291.

Herbaceous, climber, rarely shrub with entire lobed or palmately compound leaves. Flowers solitary, axillary in few flowered dichasia or sub-umbellate. Sepals sub-equal, oblong. Corolla infundibuliform, white or yellow. Anthers twisted; pollen usually 3-colpate. Stigma globose; ovary 1-4 celled.Seeds 4, usually dull glabrous.

A genus of c. 40 species, found in warmer regions.

Merremia aegyptiaca (L.) Urban, Symb. Antill. 4: 505. 1910; Austin, l. c. 54. f. 7. B-C.

Ipomea aegyptia L., Sp. Pl. 1: 162. 1753

Annual, climbing herb, completely hirsute with long, erect to sub erect, light pale, trichomes. Leaves palmately compound; leaflets elliptic, acuminate, apically acute. Flowers in cymes, long peduncled. Sepals oblong, 1.5-2.0 cm long, acute, white, with yellowish trichomes. Corolla white, 2-3 cm long. Fruits subglobose, subtended by the calyx. Seeds brown, glabrous.

Specimen studied: Nagarparkar, 17-9-2003, *Zamarrud* 330 (KUH);

Nagarparkar near Rangers check post, 24-3-05, *Zamarrud* 681 (KUH).

A Pantropical weed.

Ecological note: Grows on the plains and the slopes of the hills, climbing on large shrubs such as *Prosopis juliflora* and *Euphorbia caducifolia.*

Flowering period: September-Ocotober

RIVEA

Choisy in Mem. Soc. Phys. Geneve. 6: 408. 1834; Austin , l. c. 60; M.D. Dassanayake & F. R. Fosberg, l.c.358.

Large twinning, shrub with usually large, suborbicular leaves. Flowers solitary, axillary in 2-3 flowered cymes. Fruit almost dry, globose, usually indehiscent, rarely irregularly breaking up. Seeds 1-4, enclosed in mealy pulp.

A small genus of c. 6 species, found in Srilanka, southern India and Pakistan.

Rivea hypocrateriformis (Desr.) Choisy in Mem. Soc. Phys. Genev 6: 408. 1834; Austin, l. c. 60. f. 8. D-F.

Convolvulus hypocrateriformis Desr. In Lam. Encyc. 3: 561. 1792.

Perennial, climbing, herb.Leaves ovate, cordate or ovate-cordate, rounded, pubescent below, glabrous above, obtuse. Flowers nocturnal, solitary or sometimes subspicate. Sepals unequal, ovate, obtuse, 8-12 mm long, densely short, villose outside.Corolla salverform, 5-9 cm long. Fruits dry-baccate. Seeds glabrous, brown.

Specimen studied: Karanjhar hill, 19-9-03, *Zamarrud* 424(KUH).

Distributed in southren India to Pakistan.

Ecological note: A typical Indian elements, grows on the hills and the mounds abundently, climbing on *Salvadora persica* and *Acacia* trees, also in sandy areas betwwen the hills.

SEDDERA

Hochst., Flora 27, Bell. 7, t. 5. 1844. Austin, l. c. 61.

Annual or perennial; branches erect or prostrate with small variable leaves with usually midi-fixed trichomes. Flowers in axillary or in terminal or in clustered cymes. Sepals subequal. Corolla infundibuliform. Style bifid with peltate stigma. Capsule with 4-ovuled.

A genus of c. 20 species, found in India, Pakistan and Arabia. Only 1 species found in Pakistan (Nagararkar).

Seddera latifolia Hochst. & Steud. in Flora 27, Beil. 8, t. 5, f. B-C. 1844; Austin, l. c. 61. f. 8. G-H.

Breweria latifolia (Hochst.) Benth., Gen. Pl. 2: 877. 1873.

Perennial, branched, herb, old branches sometimes become spinescent. Leaves subsessile or short petiolate, small, simple, alternate, ovate, oblong, silky grey pubescent. Flowers subsessile, solitary and clustered above, axillary. Sepals 5, ovate, acuminate, 3 mm, pubescent outside. Capsule, hairy at the apex. Seeds black, oblong.

Specimen studied: upto 15 cm tall, 18-3-2003, *Zamarrud & Sarwar* 235(KUH).

Distributed in Arabia, Pakistan and India.

Ecological note: Grows rarely on sandy plains.

Flowering period: March-September.

2.3.15. CUCURBITACEAE

Mostly annual or perennial, climbing with tendrils or trailing or prostrate herbs. Leaves petiolate, alternate, palmately veined, simple. Flowers usually solitary, sometimes in cymes or racemes, unisexual. Sepals and petals 5. Carpels 3, syncarpous; ovary inferior, 1-3 celled, many ovuled. Fruit usually a peppo.

A family with c. 120 genera and c.775 species, distributed in tropical and warm regions.

KEY TO THE GENERA

1+	Petals free.....*Luffa*
-	Petals connate.....2
2+	Peduncle with foliaceous bracts.Calyx tubes closed below by 2-3 incurved scales.....*Mamordica*
-	Peduncle ebracteate, if bracts present, not foliaceous. Calyx tube without scales.....3
3+	Leaves pinnately lobed. Flowers solitary.....*Citrulus*
-	Leaves 3-7 or palmately lobed. Flowers not solitary.....4
4+	Monoecious herb. Flowers yellow, pistillode present.....*Cucumis*
-	Dioecious herb. Flowers white, brownish-yellow, pistillode absent..... .....*Coccinia*

CITRULUS

Schrad.ex Eckl. & Zeyh., Enum. 279. 1836, *nom. conserv.*, Nazimuddin & Naqvi in E.Nasir & Ali, Fl. Pak. 154: 11. 1984; D. Philox in M. D. Dassanayake, Fl. Cey(rev.).11:19.1997.

Monoecious herb or ± woody at the base, twiner with tendrils.Leaves simple, usually deeply lobed. Flowers solitary. Stamens inserted on the tube.Ovary subglobose with many ovules. Staminode present. Fruit medium-large, fleshy.

A genus with c.3 species, mainly found in Africa and Asia. Represented by two species in our area including cultivated one.

KEY TO THE SPECIES

1+	Tendrils simple or sometimes bifid, fruit 5-10 cm across, (wild).....*C. colocynthis*
-	Tendrils 2-3 fid, fruit 25-40 cm across, (cultivated).....*C. lanatus*

Citrulus colocynthis (L.) Schrad in Linnaea 12: 414. 1838; Nazimuddin & Naqvi, l. c. 12. f. 3. I-M; D. Philox, l.c.20.

Cucumis colocynthis L., Sp. Pl. 2: 1011. 1753.

Perennial, trailing, herb.Tendrils simple sometimes bifid.Leaves ovate , 10-110 x 1-66 mm, 3-5 lobed, scabrid hairy; petiole 4-5 mm long. Male flowers: Pedicellate. Calyx campanulate 4-9 x 5 mm. Stamens 3, free. Female flowers: Pedicel longer than male. Calyx tube short, lobes lanceolate c. 5 mm long. Ovary hairy, subglobose or obovate.Fruits 5-10 cm across, pulp bitter, pale white. Seeds numerous, ovate-oblong.

Specimen studied: Nagarparkar, sandy plains along roadside, 19-9-2004, *Zamarrud* 517 (KUH).

Species found in North tropical Africa, Atlantic Islands, North-west India, Pakistan and Australia.

Ecological note: Common species of Nagarparkar plains, hills and sand dunes.

Flowering period: February-March.

Citrulus lanatus (Thunb.) Mats. & Nakai, Cat.Sem. Spor. Hort. Bot. Univ. Imp. Tokyo 30. 1916; Nazimuddin & Naqvi, l. c. 14; D. Philox, l.c.21.

Momardica lanata Thunb., Prodr. Fl. Cap. 13. 1794.

Monoecious, annual, herb; stem villous hairy, trailing, tendril robust, pubescent, 2-3 fid. Leaves with 3-5 segments, elongated-ovate, obtuse more or less pinnately sinuate, lobulate, margin minutely denticulate. Male flowers: Pedicel 2-4 cm.Calyx campanulate, lobes longer than tube, c. 5 mm long. Petals yellow, 7-16 x 4 mm, obovate-oblong. Female flowers: pedicel 6 cm long. Ovary ellipsoid or subglobose, hairy. Fruits 20-40 cm across;pulp fleshy, reddish, yellow or white. Seeds black, red or brown, ovate, smooth, numerous.

Specimen studied: Cultivated species throughout the region, 15-9-2003, *Zamarrud* 310 (KUH).

Native species of Kalahari region(Africa). Cultivated throughout warm tropical regions for its edible fruit.

Ecological note: Grows as an escape throughout the region.

Flowering period: March-August

CUCUMIS

L., Sp. Pl. 1011. 1753; Gen. Pl. 5.442. 1754; Nazimuddin & Naqvi, l. c. 41; D. Philox, l.c.26.

Monoecious, usually annual, climbing herb with simple tendrils and 3-7 lobed, dentate leaves. Flowers: male flowers in fascicles, calyx 5-lobed, corolla usually subcampanulate, 5-lobed. Stamens 3, inserted at the calyx base. Female flowers solitary; staminode setiform. Style short, simple, ovary ovoid with numerous ovules.Fruit echinate.Seeds compressed.

A genus of c. 25 species, mostly found in tropical Africa and also in tropical Asia.

KEY TO THE SPECIES

1+	Fruit echinate to tuberculate (Wild).....*C. prophetarum*
-	Fruit smooth cultivated 2
2+	Leaves with acute lobes. Ovary hisipidulous. Fruit cylindric.....*C. sativus*
	Leaves with obtuse lobes.Ovary hairy to densely wooly. Fruits cylindric to globose.....*C. melo*

Cucumis melo L., Sp. Pl. 1011. 1753; Nazimuddin & Naqvi, l. c. 44; D. Philox, l.c.26.

Annual, trailing, rarely climbing herb; stem angular, sometimes circular, hirsute. Leaves reniform, 5-angled or shallowly 5-lobed, both surfaces hairy, 5-15 x 4-5 cm, variable in size. Male flowers fasciculate, peduncle 2-3 cm long. Calyx tube villous, 5-8 mm long; sepals subulate. Corolla 1-2 cm long. Stigma usually 3, rarely 5, obtuse, obovate. Fruits light green, yellow, generally glabrous, pulp pale yellow. Seeds white.

Two varieties are present in our area.

KEY TO THE VARIETIES

1+	Fruit 20-90 x 2.5-8 cm, glabrescent with ridges and furrows.....var. ***flexuosus***
-	Fruit 5-20 cm across, glabrous, smooth.....var. ***melo***

Cucumis melo L., var ***melo***

It is characterized by having large, globose –ovoid and 5-20 cm across fruits.

Specimen studied: Along road side of *Pennisetum* field, Nagarparkar plains, 18-3-2003, *Zamarrud* 243 (KUH).

Cultivated throughout the warmer parts of both the hemispheres for its edible fruit.

Ecological note: Escape from cultivation.

Cucumis melo var ***flexuosus*** (L.) Naudin in Ann. Sc. Nat. Ser. 4(11): 5. 87. 1859.

Cucumis flexuosus L., Sp. Pl. 2. ed. 1437. 1763.

It is characterized by having longer, 20-90 x 2.5-8 cm fruits which are soft hairy when young. Seeds are smaller than var melo.

Specimen studied: Nagarparkar, sandy areas, 14-9-2004, *Zamarrud* 548 (KUH).

Cultivated species throughout the warmer parts of the world.

Ecological note: Grows as an escape.

Cucumis prophetarum L., Cent. 1: 32. 1755;Nazimuddin & Naqvi,l.c. 43.

Prostrate or climbing, perennial, herb; stem slender, hispid, trailing with short, simple, scabrid tendrils. Leaves petiolate , ovate-orbicular, cordate,2-4 cm long lobed, lobes obtuse, dentate, hispid on both surfaces. Male flowers: in fasicles of 2-3 flowers, rarely solitary. Calyx lobes linear. Corolla lobes ovate- oblong. Female flowers: solitary. Calyx and corolla similar to male.Ovary muricate. Fruit ovoid or subglobose yellow, striped; pulp spongy, pale white, Seeds grayish, oblong, ellipsoid.

Specimen studied:Nagarparkar sandy plains near Ammaniabad goath, 23-11- 2002, *Zamarrud & Sarwar*24(KUH).

A paleotropic species.

Ecological note: Frequent on the plains and the hills.

Cucumis sativus L., Sp. Pl. 2: 1012. 1753; Nazimuddin & Naqvi, l. c. 42; D. Philox, l.c.27.

An annual, climbing, herb; stem angular, scabrous hairy. Leaves petiolate, ovate, 3-8 lobed; petiole 8-20 mm long. Flowers unisexual, regular. Calyx lobes spreading, subulate. Corolla yellow with 5 connate petals, upto 2.5 cm long. Male flowers: anthers 3-4 mm

long .Female flowers: flowers with 3 carples, syncarpous. Ovary fusiform. Fruits oblong, cylindrical or slightly angular, pulp pale white. Seeds small, innumerous.

Specimen studied: Nagarparkar, cultivated plains, trailing herb, fls. yellow with simple tendrils, 19-9-2004, *Zamarrud* 559 (KUH).

Cultivated in tropics and subtropics of both the worlds for its edible fruit.

Ecological note: Grows frequently on the hills and the sandy plains.

COCCINIA

Wight & Arn., Prodr. 1: 347. 1834; Nazimuddin & Naqvi, l. c. 18; D. Philox, l.c.28.

Dioecious, climbing herb with simple or bifid tendrils and simple, petiolate, usually distinct shaped leaves.Male and female flowers white, large infundibular, found on different plants. Stamens 3.Ovary ovoid. Fruit globose-elongate, many seeded.

A genus of c.30 species, mainly found in tropical S. Africa, tropical India and Malaysia.

Coccinia grandis (L.) Voigt, Hort. Suburb. Calc. 59. 1845; Nazimuddin, l. c. 19. f. 1. D-H; D. Philox, l.c.28.

Bryonia grandis L., Mant. Pl. 1: 126. 1767.

Prostrate or climbing, perennial, bright green, herb; stem branched, cylindrical, glabrous. Leaves cordate, 5-angular, 5-10 cm across; petiole striate, 2-(2.5)-5 cm long. Calyx and corolla 5-lobed each, companulate; pedicel 1.5-2.5 cm long. Male flower: solitary, clustered or shortly raceme. Stamens inserted; filaments rarely free; pistilodes absent.Female flower: solitary rarely racemose. Style slender; staminode 3; stigma 3-fid. Fruits cylindrical or fusiform, 7-25 cm long, dehiscent, slightly beaked. Seeds pyriform, compressed.

Specimen studied: Karanjhar hill, near ranger's head quarter, 27-3-05, *Zamarrud & Alam*739 (KUH).

Distributed in Malaysia, India, Pakistan and Tropical Africa.

Ecological note: Usually as a climber on large shrubs.

LUFFA

Mill., Gard. Dict. Abridg. ed. 4. 1754; Nazimuddin & Naqvi, l.c. 24; D. Philox, l.c.17.

Monoecious or dioecious, climbing herb with 3-6 fid tendrils.Leaves.simple, palmately 5-7 lobed. Male flower: racemose; calyx campanulate; petals 5, free. Stamens 3-5, monothecous, anthers free. Female flowers: solitary; ovary tuberculate with many ovules. Fruit subglobose-elongated-cylindrical, beaked.

A genus with c. 6 species, distributed in Old and New Worlds.

Luffa cylindrica (L.) Roem., Syn. Monogr. 2: 63. 1846; Nazimuddin& Naqvi, l. c. 26.

Momordica cylindrica L., Sp. Pl. 1009. 1753; D. Philox, l.c.17.

Annual, climbing or trailing, herb with pubescent tendrils. Leaves palmate, 5-lobed or orbicular-cordate, 6-25 cm in diameter, lobes triangular, lanceolate; petiole 5-15 cm long. Flowers bright yellow, both male and female in the same axil, pedicellate.Male flowers: 15-20 flowered in long, axillary, raceme. Female flowers: Calyx tube short, pubescent. Petals obovate-cuneiform, 2-3.5 x 1-2.5 cm. Ovary cylindrical, hairy. Fruits fusiform,smooth. Seeds elliptic-ovoid, numerous.

Specimen studied: Nagarparkar, 19-9- 2004, *Zamarrud* 594(KUH).

Cultivated in warmer parts of Asia and Africa for its edible fruit.

Ecological note: During monsoon found throughout the sandy plains.

Flowering period: March- August.

MAMORDICA

L. Sp. Pl. 1009. 1753; Gen. P l. 5. 440 1754; Nazimuddin & Naqvi, l.c.4; D. Philox, l.c.22.

Monoecious or dioecious, annual or perennial climbing herb with simple or bifid tendrils and palmately 3-9 lobed leaves. Flowers usually with large foliaceous bracts; unisexual. Male flowers: solitary, corymbose, racemose. Stamens 3, inserted on the mouth of the calyx tube. Female flowers: solitary. Ovary with many ovules.

A genus with 45 species, found in Paleotropical regions.

Mamordica balsamina L., Sp. Pl. 1009. 1753; Nazimuddin & Naqvi, l. c. 5. f. 1. A- C.

Annual climber, unbranched, glabrous; monoecious. Leaves orbicular 1.5-(2.5)-5.0(-12.0) cm, cordate, sparsely hairy at the veins, 3-5lobed; petiole 1-4 cm long. Flowers yellow;

pedicellate. Sepals ovate, 4.5-6 x 2.5-3.5 mm. Petals obovate, 9.5-15x 7.5-12 mm. Male flowers: peduncle 1.5-7 cm long; bracteate. Stamens 3 rarely 2; filaments short; anthers coherent first then free. Female flowers: peduncles 5-15 mm long. Staminode absent. Ovary fusiform, beaked. Fruit tuberculate. Seeds elliptic-ovate.

Specimen studied: Kasbo, 24-3-05, *Zamarrud* 686 (KUH).

Widespread in the drier parts of South Africa and Tropical Africa, Arabia, Tropical Asia and Australia.

Ecological note: Grows abundantly in Kasbo usually as climber on *Acacia nilotica, Azadirechta indica* and shrubs.

Flowering period: March- August.

2.3.16. CUSCUTACEAE

A parasitic herb with short-lived root system. Stem thread like, coloured, chlorophyll absent. Flowers small in cymes.Corolla tubular. Stamens 5, epipetalous. Carpels 2, syncarpous; ovary superior, 2-celled, each cell 4-ovuled. Fruit a capsule.

A unigeneric family with c. 100 species, widely distributed throughout the World.

CUSCUTA

L., Sp. Pl. 124. 1753; Gen. Pl. 5. 140.1754; Rajput & Tahir in E. Nasir & Ali, Fl. Pak. 189: 1. 1988.

A leafless, yellow or reddish, twining, annual to perennial, parasite with filiform stems, attached to host by haustaria. Flowers solitary or in lateral fasciles or short racemes or in umbellate-like cymes, small, fleshy, connate below. Corolla usually 4-5 lobed. Stamens 5 or 4, inserted near the throat, alternating with the corolla lobes. Ovary 2-celled, each cell 2-ovuled; Style 1-2; stigma capitate or 2. Capsule globose, circumscissile or breaking irregularly. Seeds 2-4, glabrous.

A genus with c. 100 species of cosmopolitan in distribution. Represented here by 1 species.

Cuscuta reflexa Roxb., Pl. Corom. 2: 3. Pl. 104. 1798; Rajput & Tahir, l. c. 5.

Stem brownish or yellow, thin, densely intermingled, hairy. Leaves 1.5-3.5x0.5-1 mm, obovate to linear. Flowers in cyme or solitary, peduncle 2-2.5 mm long; pedicel 1-5 mm;

bracts leaf like.Calyx 5-lobed; lobes oblong,ovate-obtuse, acuminate, 0.7-3 x 1.5-2.5 mm; tube short. Corolla lobes oblong, elliptic, sharply acute, 1-2.2 x 0.5-1 mm long. Stamens 1 mm long; anthers basifixed; filaments linear, connate. Ovary fleshy, ovoid to globose, conical, dark brown. Fruit ± globose with persistent style, dehiscing irregularly. Seed 4, dark brown.

Distributed from Indonesia to Afghanistan through Srilanka, Northren India, China and Pakistan.

Specimen studied: Karanjhar hills at the top of the hills, dark brown wines, 24-3-2005, *Zamarrud & Alam* 682 (KUH).

Ecological note: Found occasionally on the rocky slopes.

Flowering period: July - August

2.3.17. ELATINACEAE

Aquatic or semi aquatic annual, perennial herbs or shrubs sometimes with stipulate, simple, opposite or verticellate leaves. Flowers small, solitary, axillary or in fasciculate cyme. Sepals usually 3-5, free or basally connate. Petals usually 3-5, free. Stamens 3-10, alternating with the petals. Carpels 3-5, syncarpous; ovary superior, 3-5 celled, ovules numerous, many in each cell. Fruit a capsule.

A small family of c.2 genera and c.40 species, found in temperate and tropical regions. 1 species is found in Nagarparkar.

BERGIA

L., Mant. 2: 152. 1771; Boiss., Fl. Or.1:783. 1876; Ghafoor in E.Nasir & Ali, Fl. Pak. 19: 1. 1972; M.D. Dassanayake & F. R. Fosberg in M.D. Dassanayake, Fl. Cey (rev.). 1: 424. 1980.

Annual or perennial, diffusely branched, glabrous herb. Leaves linear to elliptic, usually serrate. Flowers sessile and pedicellate. Sepals and petals 3-5 each, ovate-oblong. Stamens usually 5 or 10 in 2-series; anthers small.Ovary ovoid or subglobose-globose. Style 3-5, free. Capsule ovoid-globose.

A genus with c. 25 species, distributed in temperate and tropical regions.

Bergia suffroticosa (Delile) Fenzl., Denksch. Bot. Ges. 3: 183. 1841; Chaudhri & Chuttar, Veg. Rang.Fl. Thar desert, 76. 1966; Ghafoor, l. c. 3.

An aromatic, perennial herb with difusely branched, glandular-glabrescent stem; bark pappery. Leaves sessile or subsessile, sometimes pseudoverticillate, 3-30 x 2-10 mm, obovate-oblong to oblanceolate or elliptic, densely pubescent; stipules linear or lanceolate,1-3 mm long, pubescent. Flowers white-pink. Sepals free, ovate. Petals obovate-oblong.Stamens 10. Ovary ovoid, 5-celled. Seeds many, oblong- ellipsoid, dark brown- black.

Specimen studied: Near Budhasar , Nagarparkar, Ranger's head Quarter, 18-9-2004, *Zamarrud* 586 (KUH).

Species found in India, Pakistan, Iran, Arabia, Sudan, Senegal, Muritiana, Kenya and Egypt.

Ecological note: A common species along seasonal streams in the region.

Flowering period: August-September

2.3.18. EUPHORBIACEAE

Usually herbs, shrubs and trees with latex and sometimes fleshy stems. Leaves alternate, usually simple. Flowers usually in cymes but cyathium in *Euphorbia*, unisexual.Sepals usually 3-5.Petals usually 3-5 sometimes absent. Stamens equal or twice the number of petals or reduced to 1. Carpels 3, syncarpous; ovary superior, 3-celled with 1 or sometimes 2 ovules. Fruit a capsule, rarely berry or nut.

One of the largest families of the worldwide occurrence consisting of more than 300 genera and c.8100 species.

KEY TO THE GENERA

1+	Inflorescence a cythium.....*Euphorbia*
-	Inflorescence various type but not a cythium.....2
2+	Leaves palmately lobed. Stamens branched.....*Ricinis*
-	Leaves unlobed. Stamens unbranched.....3
3+	Ovary with 2 ovules in each cell.....*Phyllanthus*
-	Ovary with 1 ovule in each cell.....*Acalypha*

ACALYPHA

L., Sp. Pl.: 1003. 1753; Gen. Pl. 5. 436. 1754; A.Radcliffe-.Smith in E. Nasir & Ali, Fl. Pak. 172: 61.1986.

Annual herbs to trees, usually monoecious, rarely dioecious, often glandular hairy with alternate, simple, petiolate and stipulate leaves. Flowers both bisexual or unisexual arranged in terminal or axillary raceme.Male flowers pedicellate with small bract. Calyx 4-lobed. Petals absent. Stamens 8; pistillode absent . Female flowers pedicellate or sessile with foliaceous, acrescent bracts. Calyx 3-5 lobed. Petals absent . Ovary 1-celled. Fruit trilobate, small, septicidally 3- valved cocci. Seeds subglobose with ventral ridge. A genus of c. 450 species. Represented by 1 species in study area.

Acalypha indica L., Sp. Pl., 1: 1003. 1753; A.Radcliffe-Smith, l. c. 63. f. 12. C-E. 1986.

Annual or perennial herb, up to 2.5 m tall. Leaves simple, ovate, rhombic-ovate, lanceolate, 2-9 x 1-5 cm; stipules subulate-filiform, 1-2 mm long; petiole 2-12 cm. Inflorscence axillary, pedunculate, usually 5 cm long; male flowers below, female flowers above. Male flower: dense, sessile.Sepals triangular-ovate, 1 mm long, ciliate. Female flowers: lax, sessile. Style free or connate, filiform, 1-2 mm long. Ovary trilobed, 0.5 mm across, tuberculate, pubescent.Fruit 2 mm across. Seeds ovoid, 1.3 mm, ± smooth, grey.

Specimen studied: Near Maya dam at the foot hills, 16-9-2004, *Zamarrud* 572(KUH).

Found in both the hemispheres, introduced in America.

Ecological note: Fairly common at foot hills with *Indigofera cordifolia*.

Flowering period: August - September

EUPHORBIA

L. Sp. Pl. 450. 1753; Gen. Pl. 5. 208. 1754; A.Radcliffe-Smith, l.c.88;D. Philox in M.D.Dassanayake, Fl.Cey(rev.) 11:192.1997.

Monoecious herb or large shrub with milky latex.Leaves of 3 types(i) basal leaves alternate(ii) median leaves whorled (iii) upper whorled or opposite. Inflorescence a cyathium with 1 female flower and several bracteate male flowers. Stamen 1. Ovary 3-celled. Fruit a capsule of 3-valved cocci. Seeds usually carunculate.

A large genus of c. 2000 species, found throughout the world.

KEY TO THE SPECIES

1+	Plants large shrubs, succulent, usually leafless throughout the year except after rain, stipules spiny.....*E.caducifolia*
-	Plants small herbs, not succulent, leffy throughout the year, stipules not spiny.....2
2+	Cyathia in cluster.....3
-	Cyathia axillary, solitary.....4
3+	Leaves rhombic, hairs multicellular, yellow, cythia in dense, axillary, pedunculate clusters.....*E. hirta*
-	Leaves oblong, hairy usually 1-celled, white, cythia in loose cluster, terminating lateral shoots.....*E. hypercifolia*
4+	Leaves entire or almost so.....*E. granulata*
-	Leaves minutely denticulate, serulate, or serrate.....5
5+	Plant completely glabrous, leaf blades, narrowly falcate-oblong.....*E. clarkeana*
-	Plant hairy above and glabrous below; leaf blades obovate-suborbicular or ovate-oblong.....*E. prostrata*

Euphorbia caducifolia Haines in Ind. For. 40: 154. 1914; A. Radcliffe-Smith, l. c. 118.

Shrub with many succulent, stems c. 3 x 10 m. Leaves alternate, sessile-subsessile, deciduous, 1.5-8 x 1-5 cm; stipules spiny, 1 cm long, paired on each spine shield. Cythia 3 in axillary, pedunculate cymes. Styles united above the middle. Fruit triradiate, laterally compressed. Seeds ovoid-quadrangular.

Specimen studied: Karanjhar hills-rocky plains, 16-9-2003, *Zamarrud & Sarwar* 327 (KUH).

Species found in India and Pakistan.

Ecological note: *Euphorbia caducifolia* is fairly common on the hills especially on the southern slops; grows with *Panicum turgidum,Capparis decidua* and *Cadaba farinosa* as subdominant species.

Flowering period: March-August

Euphorbia clarkeana Hook. f., Fl. Brit. Ind. 5: 253. 1887; A. Radcliffe-Smith, l. c. 102. f. 19. A-C.

Prostate, annual. Leaves narrowly oblique, falcate-oblong, 2-13 x 1-4 mm, usually minute, denticulate. Cythia solitary,axillary, glandular appendages minute or absent. Involucre 5-lobed, enclosing the cyathia. Pistil 3-lobed. Fruit trigonous, glabrous. Seeds ovoid, shallowly rugulose or almost smooth.

Specimen studied: Budhasar near Nagarparkar, 26-10-1970, *Qaiser, Ghafoor & Abrar Hussain* 4114 (KUH); Nagarparkar town,16-9-2003, *Zamarrud & Sarwar* 326 (KUH).

Species found in Afghanistan, Pakistan and India

Ecological note: Occurs among the grass, common on the plains and the hills.

Flowering Period: February-September

Euphorbia granulata Forssk., Fl. Aegypt-Arab. 94. 1775; A. Radcliffe-Smith, l. c. 101. f. 18. D-F; D. Philox,l.c.201.

Annual or perennial, prostrate, branched herb, glabrous, upto 20 cm long. Leaves short petiolate or subsessile, opposite, obovate, oblong with rounded base; stipules short, subulate. Inflorescence a cyathium, solitary, axillary; glands transversely ovate, yellow, ochreous or red . Fruits trigonous .Seeds quadrangular, foveolate-regulose, pinkish-grey.

Specimen studied: Nagarparkar, sandy plains, 24-9-2005, *Zamarrud & Alam* 867(KUH).

Widely found in Asia and Africa.

Ecological note: Grows infrequently on the plains with *Eclipta prostrata, Corchorus deprassus and Euphorbia prostrata.*

Flowering period: August - October

Euphorbia hirta L., Sp. Pl. 454. 1753; A.Radcliffe-Smith, l. c. 95. f. 17. A-D.

Annual with ascending branches upto 60 cm long, multicellular hairy . Leaves simple, opposite, ovate, elliptic, 1-5 x 0.5-8 cm; petiole 1-3 mm long; stipules subulate, 1-2 mm long. Cyathia, pink, many in dense axillary, cluster; peduncles 0.5-1 cm long. Fruits sharply trigonous. Seeds ovoid-quardrangular with transverse ridges, grey.

Specimen studied: Nagarparkar,cultivated fields, 16-9-2004, *Zamarrud* 573 (KUH).

A pantropical weed.

Ecological note: Common species, grows with *Cynodon dactylon* and *Oxalis corniculata* on sandy plains near cultivated fields and occasionally on the hills.

Flowering period: March – September

Euphorbia hypericifolia L., Sp. Pl. 454. 1753; A.Radcliffe-Smith, l. c. 98. f. 17. E-G.

Annual, ascending, branched, herb, 15-25 cm, almost glabrous. Leaves subsessile, elliptic-lanceolate, acute, attenuate; stipules linear, 1-1.5 mm long. Inflorescence a cyathiam in lax cluster, axillary, cyathial glands purplish. Fruits trignous, glabrous with dome like appendages on the surface. Seeds ovoid, smooth, greyish black.

Specimen studied: Temporary water accumulated area near Budhasar,annual herb, upto 15 cm tall, 15-9-2003, *Zamarrud* 315 (KUH).

A native of the New World tropics, introduced and naturalized in tropics and subtropics of the Old World.

Ecological note: Found near water or in wet soil with grasses and sedges.

Flowering period: September - October

Euphorbia prostrata Ait. Hort. Kew, ed. 1, 2: 139. 1789; A. Radcliffe-Smith, l. c. 106. f. 19. D-G.

Annual, prostrate, herb; stem rounded, glabrous, 15-16 cm long, terete. Leaves oblong-ovate, 2-5 x 1-3 mm, entire, acute, obtuse, obliquely rounded at the base, glabrous; stipules triangular, laciniate. Inflorescence a cyathium, solitary in the leaf axil on microphyllous lateral shoots, peduncle 2 mm long. Fruits trigonous, glabrous, keel carinate, ciliate. Seeds greyish, ovoid-quadrangular, transversely wrinkled.

Specimen studied: Own jo wandio, 18-9-2003, *Zamarrud* 358 (KUH).

Native of tropical and subtropical America.Naturalized into many parts of the Old World as lawn and ruderal weed.

Ecological note: Grows on the plains near wet areas.

Flowering period: August – October

PHYLLANTHUS

L. Sp. Pl. 981. 1753; Gen. Pl. 5. 422. 1754; A. Radcliffe-Smith, l. c. 22; D. Philox,l.c.223.

Monoecious, herb to large shrub with distinct stem and two types stipulate leaves, cataphylls and folliage. Foliage leaves: simple, entire usually stipulate. Cataphyll:

stipules larger than foliage. Flowers unisexual; male flower with 3-5 stamens; female flower with 4-6 biserriate sepals each. Ovary 3-celled with 2 ovules. Fruit 2-valve cocci. A genus of c. 700 species, mainly distributed pantropical regions of the world.

Phyllanthus maderaspatensis L., Sp. Pl. 982. 1753; A.Radcliffe- Smith, l. c. 28. f. 6. E-H; D. Philox,l.c.209.

Annual, glabrous, upto 15 cm tall; stem branched, angular, cataphylls absent. Leaves oblanceolate, obovate 0.7 x 0.3 cm, subacute, rounded or obtuse, attenuate at the base, lateral nerves 4-8 pairs, prominent at lower surface, dull green; petiole c. 1 cm long; stipules lanceolate 1.5-2 mm, long. Male flowers: pedicel c.1 mm, long. Sepals 6, obovate-suborbicular, obtuse, yellow tinged. Stamens 3; filaments united from the base, free at the top; Females flowers: pedicel c.2 mm long. Sepals 4 – 6, biseriate, obtuse, dark olive green, white, sometimes reddish. Ovary sessile. Fruit a capsule, subglobose-globose.

Specimen studied: Karanjhar hills, annual herb upto 15 cm tall with yellow flowers, 18-3-2003, *Zamarrud & Sarwar* 217 (KUH).

Distributed in Pakistan, India, China and throughout Malaysia to Polynesia.

Ecological note: Rare on the hills.

Flowering period: March – April.

RICINUS

L. Sp. Pl. 1007. 1753; Gen. Pl. 5. 437.1754; A.Radcliffe-Smith, l. c. 69.

Annual or perennial, glabrous, herb with alternate, petiolate, palmately-lobed leaves, lobes glandular-serrate. Flowers in panicle, subterminal, or antiphyllous. Male flowers: stamens few to many. Female flowers: ovary 3-celled. Fruit trilobed.Seeds compressed-ovoid.

A monotypic genus, cultivated throughout the tropics, subtropics and warm temperate regions of the world as cultivated species.Cultivated in our and grows as an escape also.

Ricinus communis L., Sp. Pl.: 1007. 1753; A.Radcliffe- Smith, l. c. 69. f. 14. A-D.

Much branched,monoecious, c. 5 m tall shrub. Leaves palmately 7-9 lobed, petiolar gland present; stipular sheath ovate, 1-2 cm, long; petiole 5-20 cm, long. Inflorscence 8-25 cm

long; bracts 1 cm long. Male flowers: pedicellate. Calyx lobes elliptic-ovate, 4.5-8 x 2-4 mm. Petals absent. Stamens 7 mm long. Female flowers: pedicel 3-5 mm. Ovary 3-celled, each cell 1-ovuled. Style 2-7 mm long, subglobose. Fruits trilobed. Seeds streaked and with dark colour patches, carunculate.

Specimen studied: Karanjhar hills at the top i.e 1100 altitude, 17-9-2005, *Zamarrud & Qurban* 732 (KUH).

Widely cultivated species from NE Tropical Africa to tropic, subtropics and warm temperate regions.

Ecological note: Grows as an escape.

Flowering period: September – October.

2.3.19. FUMARICACEAE

Annual to perennial, glabrous, herbs. Leaves exstipulate, alternate, basal or cauline, pinnately or ternately divided. Flowers in racemes or paniculate cymes; zygomorphic. Sepals 2, bract-like, often caducous. Petals 4, 1 or 2 of the outer petals basally spurred or saceate, 2 inners connate apically over the stigma. Stamens 6, diadelphous (4 anthers monotheous and 2 ditheous). Carpels 2, syncarpous, ovary superior, 1-celled, 1-many ovuled. Fruit usually a capsule or nutlet.

A family of c. 20 genera and c.530 species distributed in N. temperate regions, a few in Africa and Asia.

FUMARIA

L., Sp. Pl. 699. 1753; Gen. Pl. 5. 314. 1754; Jafri in E.Nasir & Ali, Fl. Pak. 73: 38. 1974; M.Liden in K.Kubitzki, Fam. & Gen.Vasc. Pl.2: 316. 1993.

Scandent, glabrous, annual, herbs with pinnatisect, cauline leaves. Flowers in antiphyllous, short, bracteolate, racemes; pink, purplish, bracteate.Ovary with 1(-2) ovules. Fruit an indehiscent, 1-seeded nutlet.

A genus of c. 50 species, mainly found in cold and temperate regions of the Old World.

Fumaria indica (Hausskn.) Pugsley in Journ. Linn. Soc. Bot. 44: 313. 1919; Jafri, l. c. 39. f. 10. J.

Fumaria vaillantii Loisel var.*indica* Hausskn. in Flora, 56: 443. 1873.

Annual, 5-45 cm long, prostrate or ascending, herb. Leaves 2-10 x 2-5cm, subsessile or with long stalked, much divided. Inflorescence receme, peduncled;bract linear, white, slightly longer or as long as the pedicels. Flowers white, pink. Sepals 2, small, incospicious with whitish membrane. Petals 4, short, suborbicular. Filaments coherent; anthers dimorphic. Style short, filiform; stigma lobed; ovary suborbicular. Fruits 1-seeded. Seeds brown.

Specimen studied: Nagarparkar, Rest house, 5-4-71, *Abedin & Abrar Hussain* 6855(KUH); Kasbo-Kalidas dam, 20-3-03, *Zamarrud* 249(KUH).

Species occurs in India, Pakistan, Afghanistan and C. Asia.

Ecological note: Grows as weed around cultivated fields in Kasbo, also near water beds during monsoon.

Flowering period: March-June

2.3.20. GENTIANACEAE

Herbs to shrubs.Leaves simple, usually opposite, sometimes rosulate. Flowers in cymes, racemes or solitary. Sepals and Petals 4-8. Carpels 2, syncarpous; ovary superior, 1-celled, ovules 1-many. Fruit usually a capsule.

A family of c. 80 genera and c.700 species, widely distributed in tropical parts of both the hemispheres.

ENICOSTEMMA

Blume, Bijdr. 848. 1826; Omer in Ali and Qaiser, Fl. Pak.197: 3. 1995.

Annual to perennial herb with sessile, linear, laneolate and entire leaves. Flowers in a verticellate clusters. Calyx tubular, 5-lobed. Corolla tubular-infundibuliform. Stamens 5. Capsule deshiscing into 2-halves with many rounded seeds.

A genus of c.4 species, distributed in Central America,W. Indies and Old world including Nagarparkar.

Enicostemma hyssopifolium (Willd.) Verdoon in Bothalia 7: 462-463. 1961; Omer, l. c. 3. f. 1. A-F.

Exacum hyssopifolium Willd. Sp. Pl. 1 (2): 640. 1798.

Procumbent or decumbent, perennial, herb, 2-30 cm tall. Leaves simple, opposite, sessile, 1-10 x 0.1-1cm, 3-5, hispid above, glabrous below, linear-lanceolate. Flowers

axillary, solitary, in clusters of 2-many; pedicellate.Calyx lobes 5, 3 x 1 mm, lanceolate, entire, acute. Corolla tubular, inside green, outside milky white, 3-5.5 x 1 mm. Stamens epipetalous. Ovary sessile. Fruits several seeded, ellipsoid. Seeds rounded, yellowish green.

Specimen studied: Karanjhar hills, 17-9-03, *Zamarrud* 339(KUH).

Distributed in Tropical regions of both the hemispheres.

Ecological note: Commonly grows in saline plains of Nagarparkar and among the crevices of acidic rocks.

Flowering period: February-September.

2.3.21. LAMIACEAE(LABIATAE)

Usually annual or perennial, aromatic, herbs with usually 4-angular stem. Leaves simple, mostly opposite. Flowers usually in verticellasters; zygomorphic, bracteate. Calyx and corolla bilipped. Stamens 4 or 2, free, didynamous if 4, epipetlous. Carpels 2, syncarpous; gynobasic; ovary superior, deeply 4-lobed, 2-4 celled, each cell 1-ovuled. Fruit 1-seeded nutlet, enclosed in the calyx.

A family of cosmopolitan distribution, comprises more than 250 genera and c.6700 species.

KEY TO THE GENERA

1+	Stamens 4.....2
-	Stamens 2.....*Salvia*
2+	Plant aromatic. Corolla with lower lip entire, spreading and upper lip subequally 4-lobed.....*Ocimum*
-	Plant not aromatic. Corolla 2-lipped.....*Leucas*

OCIMUM

L. Sp. Pl. 597. 1753. Gen. Pl. 5. 256. 1754; Hedge in Ali & Y.J. Nasir, Fl. Pak. 192: 292.1990.

Annual to shrubby herbs with densely gland-dotted leaves. Flowers in terminal and lateral, elongated or condensed raceme, 6-10 in verticillasters, bracteate. Calyx ovoid-campanulate 10-nerved, uppermost lobe much shorter than the other, decurrant on tube. Corolla with lower lip entire, spreading and upper lip subequally 4-lobed. Stamens 4, exserted.Nutlets rugulose mucilagenous on wetting.

A genus of c.150 species, distributed in warm, temperate and tropical regions, mainly in Africa.

KEY TO THE SPECIES

1+	Pedicel patent in fruit, terete or so. Calyx tube glabrous inside.....*O. tenuiflorum*
-	Pedicel appressed in fruit, apically reflexed, flattened. Calyx tube hairy inside. .....*O. basilicum*

Ocimum basilicum L., Sp. Pl. 597. 1753; Hedge, l.c. 294.

Annual or perennial, upto 1 m, tall, herb. Leaves elliptic-ovate, 5 x 2 cm; petiolate.Inflorscence condensed raceme;verticillasters 3-6 flowered. Flowers white with purple tinge; pedicel appressed in fruiting, apically reflexed, flattened; bracteate. Calyx 5-7.5 mm long in fruiting, tube hairy inside. Petals 7-9 mm long. Nutlets oblong,brown.

Specimen studied: Nagarparkar, 17-9-2003, *Zamarrud & Sarwar* 423(KUH).

It is found in Asia, SE Asia and Africa

Ecological note: Found along the temporary streams with sedges and grasses.

Flowering period: September – October

Ocimum tenuiflorum L., Sp. Pl.597.1753; Hedge, l.c. 295. 1990.

Ocimum sanctum L.,Mant.1:85.1767.

Perennial , upto 60 cm tall herb. Leaves ovate-oblong, 1.5-4 x 0.8-1.5 cm, hairy, gland dotted on both surfaces; petiole 1-2 cm long.Verticellaster, 3-6 flowered;bracts 1-5 mm; pedicels 5 mm, spreading in fruit, terete or so. Calyx 1.5-2 mm. Corolla upto 4 mm, purplish or white. Nutlets brown, broadly, ovoid-elliptic.

Specimen studied: Nagarparkar, home garden near Karanjhar hills, petiole 0.5-1.5 cm long, 22-3-05, *Zamarrud* 659 (KUH).

Almost pan tropical species.

Flowering period: September - October

LEUCAS

Burm. ex. R. Br., Prodr. Fl. Nov. Holland. 504. 1810; Hedge, l.c.155.

Annual or perennial, hairy, herbs with distinct leaves, many of flowered. Calyx tubular with 6-10 ribbed veins. Corolla 2-lipped.Fruit dry nutlets.

A genus of c. 100 species, mainly distributed in Asia and Africa.

Leucas urticifolia (Vahl) R.Br, Prodr. Fl. Nov. Holland. 504. 1810; Hedge, l.c. 158.f.19.E.

Erect, upto 50 cm tall, annual herb, Leaves 4- 5 x 2-3 cm, ovate - lanceolate, upper sessile, lower with c. 2 cm long petiole. 16-40 flowered;bracts linear-lanceolate, subulate. Calyx 5-9 mm, linear-lanceolate.Corolla white, lower lip longer than upper lip. Upper lip white bearded. Nutlets 4,c.2 x 1 mm, fine glandular.

Specimen studied:Tharparkar, *Qaiser & Ghafoor* 3860 (KUH); Karanjhar hills, 27-3-2005, *Zamarrud & Alam* 746(KUH).

Species occurs in India, Pakistan, Arabia and E Africa.

Ecological note: Grows on the plains with *Boerhaavia repens* and other species and also on the hills mostly under the microclimate of large shrubs such as *Euphorbia caducifolia and Capparis decidua.*

Flowering period: March – April.

SALVIA

L. Sp. Pl. 23. 1753; Gen. Pl.5.15. 1754; Hedge, I. c. 193.

Herbs to shrub with erect stems. Leaves with simple eglandular hairs below and glandular above, entire to deeply lobed. Flowers in verticillasters, bracteate. Calyx tubular, 10-15 veined. Corolla with upper lip entire or bifid, lower lip 3-lobed. Stamens 2, staminode usually present. Nutlets 4.

A large genus with c. 900 species, distributed in temperate and tropical regions.

Salvia santolinifolia Boiss., Diagn. Pl. Or. Nov. 1, 5: 13.1844; Hedge, l.c. 200.f. 24. A-E.

An aromatic, undershrubed, upto 25 cm talll.Leaves pinnatifid, 5-13 x 1.5-3.5 mm, above to linear in outline with convolute margins; petiolate. Inflorscence with 1-2 flowered, verticillasters; bracts and bracteoles present; pedicels 1.5 5 mm. Calyx tubular-campanulate,14-16 mm long, hairy. Corolla limbed, rose to magenta colour, tube upto 17 mm long, lip c.23 mm long. Styles 2; stigmas 2-fid.Nutlets 4, ellipsoid to ± spherical, sessile glands at the apex.

Specimen studied: Karanjhar hills, 27-3-2005, *Zamarrud & Alam*756(KUH).

Distributed in Pakistan, Iran and Afghanistan.

Ecological note: Grows on rocky plains and hills in association with *Fagonia indica* and *Zygophylum simplex.*

Flowering period: March – October.

2.3.22. LEGUMINOSAE

Herbs, shrubs or trees with nodulated roots. Leaves alternate, simple or compound. Flower zygomorhic or actinomorphic. Sepals and petals 5. Stamens 10-numerous, rarely 3 or 4. Carpel 1; ovary superior, 1-celled. Fruit a legume.

A largest family of c. 650 genera and c. 18500 species worldwide in distribution, comprises 3 subfamilies.

KEY TO THE SUB FAMILIES

1+	Flowers actinomorphic.....Mimosoideae
-	Flowers zygomorphic.....2
2+	Corolla papilionaceous.Sepals usually connate. Stamens monadelphous or diadelphous.....Faboideae
-	Corolla caesalpinaceous. Sepals usually free. Stamens free.....Caesalpinioideae

i:CAESALPINIOIDEAE

Usually shrubs or trees. Leaves alternate, compound, imparipinnate. Flowers in racemes or panicles; zygomorphic. Sepals and petals 5 each. Stamens usually 10 rarely 3. Carpel 1; ovary superior or half superior, 1-celled. Fruit a legume or pod.

A subfamily comprising more than 150 genera and c.2175 species throughout the world, especially in Africa. Three genera are found in our region.

KEY TO THE GENERA

1+	Leaves simple. Ovary present on gynophore.....*Bauhinia*
-	Leaves compound. Gynophore absent.....2
2 +	Leaves bipinnate.....*Delonix*
-	Leaves unipinnate.....*Senna*

BAUHINIA

L., Sp. Pl. 374. 1753; Gen. Pl. 5. 177. 1754; Hook. f., Fl. Brit. Ind. 2: 275. 1878; Ali in E.Nasir& Ali, Fl. Pak. 54: 2. 1953.

Trees, shrubs or climbers with alternate, simple, 2-lobed leaves,. Flowers in panicles, terminal or axillary raceme or solitary. Calyx entire or coriaceous. Petals with a long claw, showy. Stamens 10 or reduced to 3. Ovary seated on a gynophore. Fruit a linear pod.

A large genus comprises c.300 species, distributed throughout the world. One species present in our region.

Bauhinia racemosa Lamk, Encyc. Meth. 1: 390. 1784; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 51. 1966; Ali, l. c.4.

A small tree. Leaves with 0.7- 2 cm long petiole; alternate, deeply 2- lobed, 2.5 x 2.5 – 7.5 cm. Inflorescence 7 – 12 cm long, raceme. Flowers with 0.5 – 1 cm long pedicel , articulate at the centre; bracts linear. Calyx spathaceous , 6 – 8 mm long, reflexed. Petals 5, oblanceolate, white. Ovary hairy; many ovuled. Legumes turgid, falcate, 12–25 x 1.5–2.5 cm, gynophore 1–1.5 cm long. Seeds black, many, 7– 8 mm long, oblong, compressed.

Distributed in China, Pakistan, India , Myanmar and Srilanka.

Specimen studied: Rangers check post near Nagarparkar bazar, up to 6 m tall with 9 cm long stamens, 26-3-05, *Zamarrud* 717 (KUH).

Ecological note: Rarer species, grows on the hill slopes with *Acacia senegal, Capparis decidua* and *Telosma cordata.*

DELONIX

Raf., Fl. Tellur. 2: 92. 1836; Ali, l. c. 42. 1973.

Trees with bipinnate, stipulate leaves. Flowers in corymbose, raceme.Sepals valvate. Petals orbicular.Ovary with numerous ovules. Fruit elongated, compressed.

The genus of c.3 species, found in Africa, Madagascar and Asia. One is found in our region.

Delonix elata (L.) Gamble, Fl. Madras 1: 396. 1919; Ali, l. c. 43. f. 13. A-D.

Poinciana elata L., Cent. Pl. 2: 16. 1756; Chaudhri & Chuttar, l.c. 53.

Medium sized tree, upto 10 m tall. Leaves 5-20 cm long, bipinnately compound, pinnae 4-8 pairs, 2.5-6 cm long; leaflets sessile-subsessile, 10-20 pairs, 4-15 x 1-3 mm long. Inflorescence terminal racemes. Flowers dark yellow below, pale above; pedicel upto 3 cm long. Sepals 5, 2-3 cm long, valvate. Petals sub-orbicular, margins curled, c. 2.5 cm long. Stamens densely hairy, coloured, 5-10 cm long. Ovary sessile. Pod 10-20 x 0.6-2.5 cm, smooth, 4-8 seeded.Seeds transverse.

Specimen studied: Rangers check post, Nagarparkar bazar, upto 6 m tall with 9 cm long stamens, 24-3-05, *Zamarrud* 677(KUH).

Distributed in Ethiopia, Arabia, Pakistan (Nagarparkar) and probably in Porebunder state of India. Cultivated in many parts of Pakistan and other countries.

Ecological note: Rarely occurs on the plains of Nagarparkar with *Prosopis cineraria.*

Flowering period: March-April.

SENNA

Mill., Gard. Diet. ed. 8. 1768.

Cassia L., Syst. ed.I .1753. p. p.

Herb or shrub with compound, paripinnate leaves. Flowers in raceme. Sepals imbricate. Corolla caesalpinaceous. Stamens 10, 3 of which are longer than the rest and not curved. Pod compressed or terete , not quite dehiscent.

A genus of c. 350 species, distributed in tropics and in warm temperate regions.

KEY TO THE SPECIES

1+	Leaflets acute.....*S. alexanderina*
-	Leaflets obtuse.....*S. italica*

Senna alexanderina Mill., Gard. Dict. ed. 8 . No .1. 1768.

Cassia senna L. Sp. Pl. 377. 1753; *Cassia angustifolia* Vahl, Symb.Bot.1:29.1970.

Fig.16: *Senna alexanderina:* Flower

Perennial herb, upto 40 cm tall; stem glabrous below, pubescent above. Leaves unipinnate, imparipinnate 8-14 cm long, rachis 1-2 cm; leaflets lanceolate-elliptic, pubescent, entire, acute-mucronate above . Inflorescence terminal or axillary raceme, upto 15 cm long. Flowers yellow, bracteate. Sepals subequal, 10-13 x 6-8 mm, yellowish. Petals 5 segments, subequal, 14-17 mm, yellow. Stamens 7, 3 reduced to staminode. Ovary sessile, stipitate, hairy. Fruit 4-10 seeded.

Specimen studied: Ranger's head quarter , perennial herb, upto 36 cm tall with yellow flowers, 25-3-05, *Zamarrud & Alam* 695 (KUH); Budhasar, 9-9-2007, *Zamarrud* 908(KUH).

Species occurs in Pakistan, India, Arabia, Algeria, Libya, Egypt, Sudan, Eriteria and Somali Republic.

Ecological note: Common in Nagarparkar plains, grows in association with *Senna italica* and trees such as *Acacia nilotica, Acacia senegal* and *Prosopis cineraria.*

Flowering period: March-June.

Senna italica Mill., Gard. Dict. ed. 8, No. 2. 1768.

Cassia italica (Mill.) F.W. Andr., Fl. Pl. Anglo-Egypt. Sudan 2: 117. 1952; Ali. l. c. 16. f. 3. A- C.

Shrub, upto 90 cm tall; stem terete, woody. Leaves 5-12 cm long, rachis eglandular, glabrous 1-3.5 cm long; leaflets 5-9 pairs, 2-2.8 x 0.8-2.5 cm, broadly oblong or obovate, glabrous; stipules 6 mm long, pubescent. Inflorescence axillary, pedunculate raceme.Ovary densely hairy. Fruit flat, papery, glabrous with distinct longitudinal crest. Seeds 9, wedge shaped.

Specimen studied: Nagarparkar town near Maya dam, 22-11-2002, *Zamarrud* 62 (KUH); Kasbo, 20-9-2003, *Zamarrud* 420(KUH); Own jo wandio, 40 cm tall, leaves 5-9 cm long, 24-3-2005, *Zamarrud & Alam* 661 (KUH); Adagam,22-3-2005, *Zamarrud & Alam* 590, 591(KUH); Budhasar, 9-9-2007, *Zamarrud* 909(KUH).

A wide spread species in Asia, West tropical and North tropical Africa.

Ecological note: Common in the plains and rare on the slopes.

Flowering period: February-October

ii:FABOIDEAE

Mostly herbs, shrubs, rarely trees with nodulated roots. Leaves alternate, simple or unipinnate. Flowers in cymes or sometimes solitary; zygomorphic. Sepals 5. Petals 5, papilionaceous. Stamens 10, usually diadelphous, rarely monadelphus. Carpel 1; ovary superior or halfsuperior, 1-celled, 1-many ovuled. Fruit a legume.

One of the largest subfamily of worldwide distribution, comprises c.425 genera and c.13,000 species.

KEY TO THE GENERA

1+	Stamens monadelphous.....2
-	Stamens diadelphous.....4
2+	Leaves pinnately compound.Fruit elongated, 3-7 cm long.....*Cyamopsis*
-	Leaves simple or palmately 3-7 lobed.Fruit 0.5-2 cm long.....3
3+	A prostrate herb.Leaves simple with entire margin, persistant. Fruit compressed.....*Goniogyna*
-	Undershrubs.Leaves simple or palmately lobed, decidous.Fruit turgid.....*Crotalaria*
4+	Plant armed.....*Alhagi*
-	Plant unarmed, rarely hairy.....5
5+	Leaves gland dotted.....*Rhyncosia*
-	Leaves not gland dotted.....6
6+	Leaves medifixed hairy. Stamens apiculate.....*Indigofera*
-	Leaves basifixed hairy. Stamens not apiculate.....7
7+	Leaves 3-foliolate.....8
-	Leaves pinnately compound.....11
8+	Leaflets entire.....9
-	Leaflets toothed.....10
9+	Leaves usually 1-foliolate, stipules scarious. Fruit jointed.....*Alysicarpus*
-	Leaves 3-foliolate, stipules herbaceous. Fruit straight.....*Vigna*
10+	Legume spirally twisted, often spiny.....*Medicago*
-	Legume straight, smooth.....*Melilotus*
11+	Leaves paripinnately compound.....*Sesbania*
-	Leaves imparipinnately compound.....*Tephrosia*

ALHAGI

Adans, Fam. 2: 328, 514. 1763; Ali in E.Nasir & Ali, Fl. Pak. 100: 319. 1977.

Small armed shrub with simple leaves.Flower in axillary racemes. Bracts small, bracteoles absent. Calyx gamosepalous. Pod glabrous, 1-9 seeded.

A genus of c. 3 species, mainly distributed in E. Mediterrenean, N. Africa and Central Asia.

Alhagi maurorum Medic. In Vorles, Churpf. Phys. Oek. Ges. 2: 397.1787; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 118. 1966; Ali, l. c. 319.

Shrub, upto 1m tall, glabrous sometimes pubescent. Leaves 10-25 x 3-5 mm,obovate; petiole 2 mm long; stipules minute.Inflorscence lateral, axillary. Flowers pedicellate, 1-3

mm long. Calyx 2-2.5 mm.Corolla reddish-pink, violet, 5-9 mm long.Fruits moniliform, 15-34 x 1.5-3 mm.

Specimen studied: Nagarparkar, cultivated field, 25-3-05, *Zamarrud* 697a (KUH).

Distributed in S.and S. W. Asia to N. Africa.

Ecological note: Dominant in the southern plains of Nagarparkar, usually in saline areas in association with *Cressa cretica, Aristida funiculata Desmostachya bipinnata* and sometimes in less saline areas with *Capparis decidua* and rarely with *Tribulus terrestris*.

Flowering period: March- June.

ALYSICARPUS

Desv. in J. Bot. Desvaux ser. 2 (1): 120. 1813; Ali,l. c. 341.

Annuals or perennial with uni or trifoliolate leaves. Flowers in terminal, axillary racemes or panicles; stipules scarious. Calyx deeply divided. Fruit 1-seeded, terete.

A genus of c. 30 species, mostly found in tropical regions of both the Worlds.

Alysicarpus monilifer (L.) DC., Prodr. 2: 353. 1825; Chaudhri & Chuttar, l. c. 119; Ali, l. c. 345.

Hedysarum moniliferum L., Mant. 1: 102. 1767.

Diffusely branched, hairy annual. Leaves unifoliate; stipules 2-8 mm long, scarious; petiole 4 mm long. Leaflets 5-15 x 5-10 mm, oblong, round.Inflorscence 10 or less flowered arranged in short, axillary, raceme; pedicel short, stout. Calyx 1.5-3.5 mm long.Ovary sessile or stipitate. Pod subglobose, moniliform, 2-8 jointed, claded with hooked hairs. Seeds arillate.

Specimen studied: Nagarparkar, Karanjhar hills, 18-3-2003 *Zamarrud and Sarwar* 224 (KUH).

Distributed from Ethiopia to India.

Ecological note: Fairly common species particularly in the western part of Nagarparkar.

Flowering period: March- October.

CROTALARIA

L., Sp. Pl. 714. 1753; Gen. Pl.5.320. 1754; Ali, l. c. 40.

Herb or shrub with simple or pinnate, 3-7 foliolate leaves. Flower in terminal racemes or antiphyllous; bracts 2, bracteoles small or absent; flowers papilionaceous. Stamens monadelphous; ovary with 2-many ovules. Fruit linear-oblong.

A large genus with c.550 species found throughout the tropics and subtropics, mainly in tropical Africa.

Crotalaria burhia Buch.-Ham. ex Benth. in Hook Lond. J. 2: 474. 1843; Chaudhri & Chuttar, l. c. 120; Ali, l. c. 45.

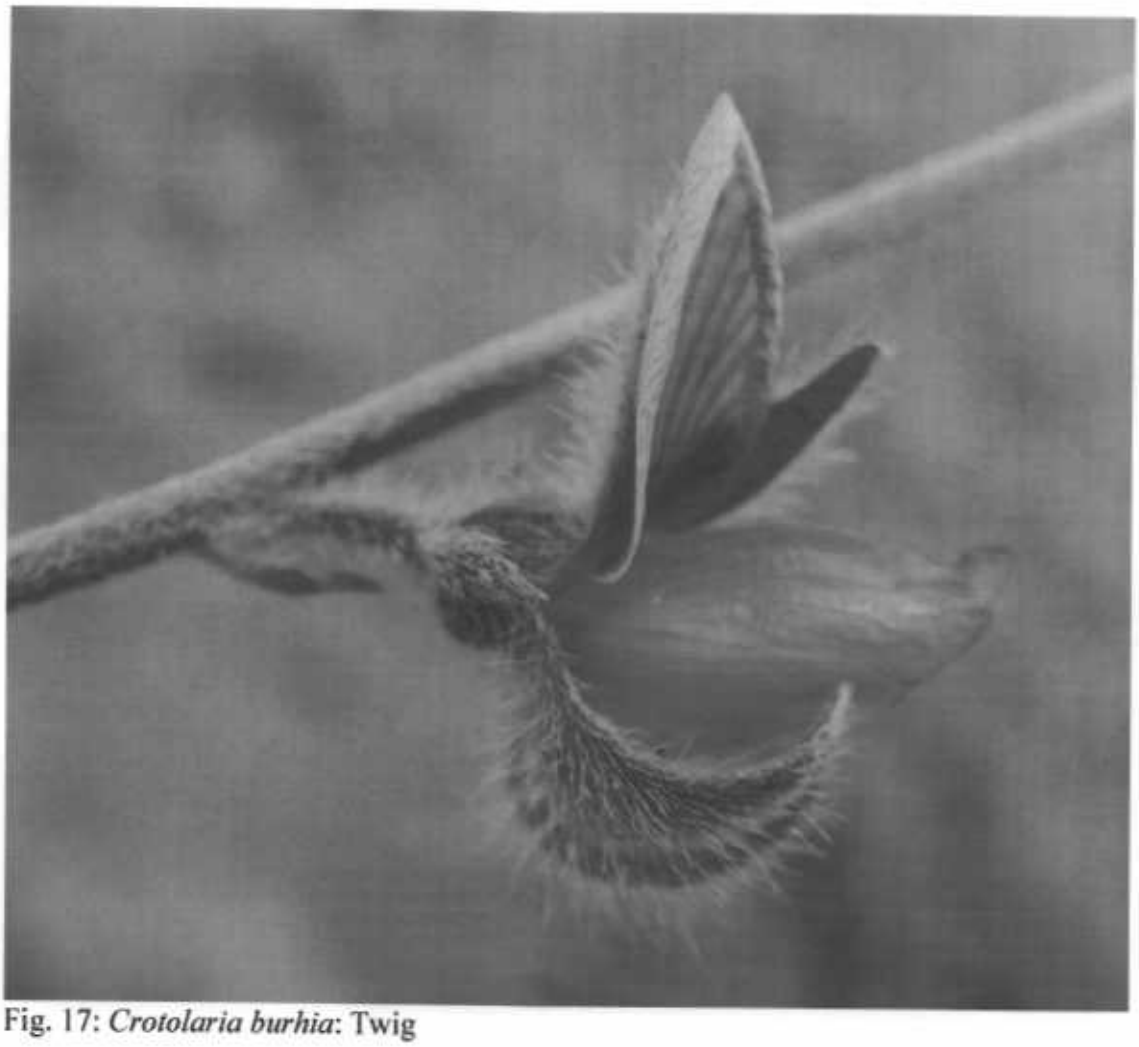


Fig. 17: *Crotolaria burhia*: Twig

Small, perennial herb, upto 60 cm tall. Leaves simple, deciduous, oblong, oblanceolate, 0.5-30 x 3-7mm, pubescent both sides. Inflorscence elongated raceme with short pedicel.

Sepals persistent, lanceolate, 3 mm.Corolla yellow. Style bearded at the apex; ovary sessile. Fruits hairy, stipitate, 3-4 seeded.

Specimen studied: Nagarparkar town near Karanjhar hills, 22-3-05, *Zamarrud* 656 (KUH).

Distributed in India, Pakistan and Afghanistan.

Ecological note: Grows abundantly in sandy plains in association with *Aerva javanica, Leptadenia pyrotechnica* and *Capparis decidua*. Absent from acidic rocks (Pink granite) while on the alkaline rocks occasionally found in association with *Euphorbia caducifolia, Capparis decidua* and *Cadaba farinosa.*

Flowering period: February- December.

CYAMOPSIS

DC., Mem. Legum. 230. 1825; Ali, l. c. 86.

Annual, upto 100 cm tall herb with imparipinnate, 3-7 foliolate leaves. Flowers in axillary, raceme.Calyx oblique with unequal teeth. Corolla purplish with spurred keel at the side. Stamens monadelphous. Ovary many ovuled. Fruit several seeded.

A genus of c. 2-3 species found in tropical Africa, Arabia, Pakistan and India. Only 1 cultivated species occurs in our region.

Cyamopsis tetragonaloba (L.) Taubert in Engl. & Prantl, naturl Pflanzenfam. 3(3): 259. 1894; Chaudhri & Chuttar, l. c. 120; Ali, l. c. 86.

Psoralea tetragonoloba L. Mant. I: 104. 1767.

Annual, upto 100 cm tall, herb; stem quardangular, pubescent, branched.Leaves trifoliate; petiole 1-3.8 cm, hairy. Leaflets 1-7.5 x 0.5-5 cm, ovate, elliptic; stipules 3-10 mm. Inflorscence axillary raceme. Bacts caducous, 4.5-5 mm long. Flowers purpulish with short pedicel. Calyx oblique, 5-6.5 mm long, teeth unequal. Corolla slightly longer than calyx. Ovary sessile. Fruits subtetragonal, pubescent, 5-8 seeded. Seeds 4 x 4 mm, arillate.

Specimen studied: Karanjhar hills, 120 cm, tall, 16-3-03, *Zamarrud* 126a, 127a, (KUH); Budhasar, 20-9-2003, *Zamarrud* 378a, 378b, 378c (KUH); Karanjhar hills, 26-3-2005, *Zamarrud* 720a, 720b, (KUH).

Distributed in India,Pakistan, Afghanistan and Arabia.

Ecological note: Cultivated throughout Nagarparkar plains and occasionally found on the top of the hills as an escape with *Panicum turgidum*, *Aerva javanica* and *Capparis decidua*.

Flowering period: March- September

GONIOGYNA

DC. in Ann. Sci. Nat. Paris Ser. 1. 4:91. Jan.1825; Ali in Taxon,16: 463.1967;in Nasir & Ali, Fl. Pak. 100: 39.1977

A prostrate herb with simple leaves and solitary, axillary flowers.

A monotypic genus found in Pakistan, India and Srilanka.

Goniogyna hirta(Willd.) Ali, l.c. 463; ll.cc. 39. f. 4. F-H, J-L.

Fig.18: *Goniogyna hirta* vigorously growing on grey granite.

Prostrate herb, with long hairy branches. Leaves exstipulate, sessile, simple 6–13 x 3 – 5 mm, hairy on both sides, ovate or broadly lanceolate, cordate. Calyx hairy with short tube . Corolla yellow, Vexillum with a pair of callus like appendages at the base, 3–6.5 mm long.Stamens monadelphus, anthers unequal, alternately dorsifixed and basifixed.Ovary sessile with 2- ovules. Fruit 3–4.5 x 2–3 mm, subglabrous, oblong, compressed.

Distributed in Pakistan, India and Srilanka.

Specimen studied: Karanjhar hills, 23-9-2003, *Zamarrud* 438(KUH).

Ecological note: Fairly common on the hills and also on sandy plains usually in association with *Senna italica.*

Flowering period: March - September

INDIGOFERA

L., Sp. Pl. 151. 1753; Gen. Pl. 5. 333. 1754; Ali, l. c. 65.

Herb or shrub with simple or imperipinnate leaves. Flowers usually in dense axillary raceme; bracts usually caducous. Calyx short, campanulate with 5 unequal teeth. Corolla caducous. Fruit linear- cylindric.

A genus of c. 300 species, mainly distributed in tropics and subtropics of both the New and Old Worlds. 6 species are recorded from Nagarparkar.

KEY TO THE SPECIES

1+	Leaves simple, fruit 1-2 seeded. 2
-	Leaves compound,fruit 3-9 seeded.....3
2+	Leaves linear, acute,stipules absent.....*I. linifolia*
-	Leaves ovate,cordate, stipules present.....*I. cordifolia*
3+	Plants annual, trailing, spreading 10-25 cm.....4
-	Plant shrub, erect upto 60 cm tall.....5
4+	Leaflets 5-7, alternate.....*I. sissiliflora*
-	Leaflets 3-5, opposite.....*I. hochstetteri*
5+	Leaflets broadly obovate, subsessile.....*I. argentea*
-	Leaflets elliptic oblong, petiole upto 13 mm long.....*I. oblongifolia*

Indigofera argentea Burm.f., Fl . Ind . 171. 1768 non L. (1777); Ali, l. c. 72. f.11. H-O.

Small shrub, 15-60 cm tall, much branched, pubescent, medifixed hairs appressed. Leaves imparipinnately compound, 1-1.7cm long; petioles 5-6 mm long;leaflets 5-11; lateral leaflets subsessile, broadly obovate, 3-4.5 mm long, obtuse, emarginate, appressed pubescent. Inflorscence pedunculate; axillary, raceme. Flowers red, small. Calyx 2-2.5 mm long, pubescent, teeth upto 1.2 mm long.Vexillum 4.5-6 mm long. Fruits linear sometimes globose, 4-8 seeded, appressed hairy.Seeds globose-cylindric, compressed.

Specimen studied: Karanjhar hills, 23-9-2003, *Zamarrud* 440 (KUH).

Species occurs in Pakistan, Iran, Arabia, Egypt, Libya,Sudan, Ethopia and Somalia.

Ecological note: Found on the plains and the foot hills.

Flowering period: Through out the year.

Indigofera cordifolia Heyne ex Roth, Nov. Pl. Sp. 357. 1821; Chaudhri & Chuttar, l. c. 124; Ali, l. c. 69. f. 12. A-G.

Annual herb; stem decumbent,prostrate,branched, pubescent. Leaves simple, sessile-subsessile, cordate,3-16 x 2.5-13 mm, pubescent;stipules short, setaceous.Inflorscence a short peduncled head of 4-8 flowered, axillary. Flowers minute, bright red. Calyx 2.3-3.5 mm, tube small, teeth linear. Corolla shorter than calyx. Fruits cylindric, 2-seeded. Seeds pitted.

Specimen studied: Karanjhar hills, 15-9-2003, *Zamarrud* 308(KUH); 17-9-2005, *Zamarrud* 786 (KUH).

Species occurs in Indonesia, India, Pakistan and Afghanistan,

Ecological note: Common in the plains.

Flowering period: August- October

Indigofera hochstetteri Baker in Oliver, Fl. Trop. Afr. 2: 101. 1871; Ali, l. c. 76. f. 12. H-J.

Annual, decumbent, prostrate herb, spreading upto 37 cm long; stem almost glabrous. Leaves imparipinnately compound, 3.5 cm long; Petiole c.13 mm long; leaflets 3-5, opposite, terminal, 0.8-2.0 x0.4-0.5 cm, oblanceolate, apiculate, pubescent. Flowers small arranged in short condenced raceme. Calyx 2-3 mm long, pubescent. Corolla slightly shorter or longer than calyx sometime equal. Fruits 5-9 seeded.

Specimen studied: Nagarparkar town, near ranger's check post, 18-9-03, *Zamarrud* 354 (KUH).

Species occurs in Afghanistan, Pakistan, India, Arabia to Africa

Ecological note: Grows on the plains in association with *Corchorus aestuans, Prosopis cineraria* and *Trianthema triquetera.*

Flowering period: August-November.

Indigofera linifolia (L.f.) Retz., Obs. 4: 29: 1786; Chaudhri & Chuttar, l. c. 124; Ali, l. c. 69. f. 9. H-M, O.

Hedysarum linifolium L. f ., Suppl. 331. 1781.

Annual, prostrate, spreading, upto 40 cm long, branched, pubescent. Leaves sessile-subsessile, simple, 12-26 x 1.5-2.6 mm, linear, acute-mucronate, pubescent; stipules minute, setaceous. Inflorescence dense, axillary with short peduncle. Calyx c. 2.6 mm long, lobes linear, teeth longer than tube. Corolla bright red; vexillum 4.5-8 mm long. Fruits 1-seeded, globose, pubescent, upto 2 mm across

Specimen studied: Ranpur, 22-11-2002, *Zamarrud* 79 (KUH); Nagarparkar town, 15-9-03, *Zamarrud* 317 (KUH); Kasbo, 16-3-2003, *Zamarrud* 204(KUH); Nagarparkar town near main bazaar, 21-9-2005, *Zamarrud* 817(KUH).

Distributed from Afghanistan, Pakistan, China, India, Mayanmar,Srilanka, Indonecia to Sudan and Australia.

Ecological note: Fairly common species of sandy plains.

Flowering period: March-October

Indigofera oblongifolia Forssk., Fl. Aegypt-Arab. 137. 1775; Chaudhri & Chuttar, l. c. 125; Ali, l. c. 71. f. 10 .G-N.

Shrublet upto 2 m tall with short branches, pubescent. Leaves stipulate, petiolate, usually 3-5 foliolate, sometimes unifoliolate; leaflets alternate, 1.5-2.6 x 6-13 mm, oblanceolate, elliptic-oblong. Flowers small, red. Calyx 1.5-2.5 mm long, hairy outside, glabrous inside, teeth 0.9- 1.2 mm. Vexillum hairy outside, 4.5-10 mm long. Fruits torulose, 6-8 seeded, hoary.

Specimen studied:Kasbo, 18-9-2004, *Zamarrud* 474(KUH); Budhasar 24-3-2005, *Zamarrud* 687, 689(KUH); Nagarparparkar sandy plains, 21-9-2005, *Zamarrud* 816 (KUH).

Distributed in Srilanka ,India, Pakistan and N. Africa.

Ecological note: Common on the plains and foot hills.

Flowering period: September-October.

Indigofera sessiliflora DC., Prodr, 2: 228. 1825; Chaudhri & Chuttar, l. c. 125; Ali, l. c.74. f. 11. A, C-G.

Annual, prostrate, herb, 10-35 cm long. Leaves petiolate, compound, imparipinnate, pubescent. Leaflets stipulate, 5-7 foliolate, alternate, oblanceolate, elliptic, obtuse 4-10 x 3.5-4.5 mm. Floweres arranged in sessile head; bracts minute, acute. Calyx 3-4.5 mm

long, teeth linear, hairy. Corolla red, 2.5-5 mm long. Fruits linear, torulose, pubescent, 3-6 seeded.

Specimen studied: Kasbo, 20-3-2003, *Zamarrud* 257(KUH); Nagarparparkar near Ranger's check post, 24-9-2005, *Zamarrud & Alam* 904(KUH).

Distributed in Pakistan, Arabia, Eritrea, Sudan, Nigeria and Senegal.

Ecological note: Commonly found on the plains.

Flowering period: September-April

MEDICAGO

L. Sp. Pl. 778. 1753; Gen. Pl. 5.339. 1754; Ali,l. c. 306.

Herb or undershrub with trifoliate leaves. Flowers in pedunculate, axillary, raceme; pedicellate and bracteate. Calyx campanulate. Corolla yellow sometimes purplish. Fruit twisted, indehiscent, 1-many seeded.

About 50 species, mainly in Mediterranean Europe, N. Africa, W. Asia, some also in C. and S. Asia and S. Africa and 1 species is reported from Nagarparkar.

Medicago sativa L., Sp. Pl. 778. 1753; Ali, l. c. 305. f. 41. A-B.

Perennial herb, upto 60 cm tall; stem erect-suberect, pubescent. Leaves petiolate; 3-foliolate; leaflets 5-20 x 3-10 mm, obovate, dentate apicaly, base entire or dentate, pubescent. Flowers blue-purplish or lavender. Calyx 5 toothed. Corolla upto 12 mm long. Fruits glabrous-hairy, many seeded.

Specimen studied: Ranger's head quarter, cultivated herb, upto 60 cm tall with blue flowers, 26-3-05, *Zamarrud & Alam* 719(KUH).

It is a Cosmopolitan weed.

Ecological note: Cultivated for fodder but also found wild in plains and foot hills in association with *Digera muricata.*

Flowering period: March-September.

MELILOTUS

Mill., Gard. Dict., Abr. Ed. 4. 1754; Ali, l.c. 309.

Herb with trifoliolate leaves. Flowers in axillary raceme. Calyx campanulate, teeth 5, unequal. Corolla white or yellow. Stamens diadelphous.Fruit indehiscent, 1-4 seeded.

A genus of c. 25 species, mainly found in the Mediterranean region and central Asia. Represented in our area by 2 species

KEY TO THE SPECIES

1+	Inflorescence with 15 cm long peduncle. Flowers white. Fruit 2-seeded.....*M. alba*
-	Inflorescence with 3 cm long peduncle. Flowers yellow.Fruit 1-seeded..... .....*M. indica*

Melilotus alba Medic., Vorles. Churpf. Phys.-oekon Ges. 2: 382. 1787; Chaudhri & Chuttar, l. c. 126; Ali, l. c. 310.

Annual herb; stem erect, upto 1.5 m tall. Leaves stipulate; trifoliolate; leaflets toothed, narrowly oblong-obovate or suborbicular, margins serrate. Inflorscence raceme, long peduncled, upto 15 cm. Calyx c. 2 mm. Corolla white, 3-5 mm long. Fruits reticulately veined, glabrous, 2-seeded.

Specimen studied: Karanjhar hills, 18-9-2004, *Zamarrud* 525(KUH).

A Cosmopolitan weed.

Ecological note: Grows frequently in cultivated fields, also at foot hills and the plains.

Flowering period: March-September.

Melilotus indica (L.) All., Fl. Pedem. 1. 308. 1785; Chaudhri & Chuttar, l. c. 126; Ali, l. c. 308.

Trifolium indica L. Sp. Pl. 765. 1753.

Annual herb; stem pubescent, upto 60 cm tall. Leaves petiole 1-3.8 cm long; leaflets 1-2.5 x 7-10 mm, oblong, lanceolate, obtuse, retuse, margins dentate, glabrescent. Inflorscence 10-16 flowered raceme with long peduncle, up to 3 cm long. Flowers pedicellate; bracteate. Calyx c. 1.5 mm long. Corolla longer than calyx, yellow. Fruits 1.5-4 mm, veined, 1-seeded.

Specimen studied: Nagarparkar, near Karanjhar hills, cultivated fields 14-9-2004, *Zamarrud* 468 (KUH).

Distributed in India, Pakistan and other parts of Asia and Europe.

Ecological note: Grows common in the fields of *Spinacea oleracea* and *Allium cepa*.

Flowering period: March- September.

RHYNCHOSIA

Lour., Fl. Cochinc. 460. 1760; (cons. nom.); Ali, l. c. 226.

Annual or perennial, climbing, prostrate or erect with pinnately trifoliolate leaves. Flowers in axillary or terminal raceme. Calyx with unequal lobes. Anthers uniform. Ovary with 1-2 ovules, stigma terminal. Fruit oblong, 1-2 seeded.

A genus of c.150 species, mainly distributed in warmer parts of the world. It is represented by 3 species in Nagarparkar.

KEY TO THE SPECIES

1+	Leaflets truncate to retuse. Fruit 7-9 mm broad.....*R. schimperi*
-	Leaflets not truncate or retuse. Fruit 5.5-6.5 mm broad.....2
2+	Leaflets minutely, hairy above, glandular-punctate below, glands orange to black. Fruit glabrous.....*R. minima*
-	Leaflets silky and gland dotted on both sides, more so below, glands yellow. Fruit densely hairy.....*R. pulverulenta*

Rhynchosia minima (L.) DC., Prodr. 2:385. 1825; Chaudhri & Chuttar, l. c. 127; Ali,l. c. 231. f. 31. Q-W.

Dolichos minimus L. Sp. Pl. 726. 1753.

Perennial herb. Leaves petiolate, 4.5-20 mm long; leaflets 0.7-2.5 cm long, ovate, rhomboid-obovate, acute, pubescent; stipules 2.5-3.5 mm long. Inflorescence a few flowered axillary raceme. Pedicel minute. Calyx 3-4.5 mm, tube shorter than the lobes. Corolla yellow, vexillum 4-6 mm.Fruits 2-seeded, glabrous.

Specimen studied: Nagarparkar hills, 24-10-70, *Qaiser & Ghafoor* 3981, 4041(KUH); Nagarparkar 24-9-2005, *Zamarrud & Alam* 843(KUH);

Distributed in Pakistan, India, Myanmar, Thiland and Indonesia

Ecological note: Found on the slopes of the hills, climbing on *Prosopis juliflora and Euphorbia caducifolia.*

Flowering period: October-March

Rhynchosia pulverulenta Stocks in Hook. J. Bot. Kew Misc. 4: 147. 1852; Ali, l. c. 232. f. 31. J-P.

Perennial herb; stem branched, prostrate, climbing, tomentose. Leaves petiolate; stipulate; leaflets 0.3-3 x 0.5-4 cm, rhomboid-transversely elliptic, acute-obtuse, pubescent. Flowers 1-10 in lax, raceme; short bracteate; pedicel upto 3 mm. Calyx tube 1-2 mm long, teeth longer than tube, pubescent, gland dotted. Corolla pale yellow, vexillum, 4-6.5 mm long. Fruits 2-seeded, 1.5-2 x 0.6 mm.

Specimen studied: Nagarparkar hills, sandy soil, *Qaiser, Ghafoor & Abrar Hussain* 4035(KUH); Nagarparkar, near Maya dam, 18-9-2003, *Zamarrud* 266 (KUH).

Distributed in India, Pakistan, Arabia and Africa.

Ecological note: Found on the slopes and the plains with *R. minima*.

Flowering period: January-March

Rhynchosia schimperi Hochst. ex Boiss., Fl. Or. 2: 626. 1872; Ali, l. c. 230. f. 31. X-Z, Z1, A1-C1.

Perennial herb.Leaves petiolate 4-10 mm, both ends pointed, velutinous, long; pinnately compound, hairy; leaflets 5-8 x 6-18 mm, truncate-retuse, obovate-orbicular.Inflorscences 1-many flowered in axillary, raceme; bracteate; pedicel 1.5-2 mm long. Calyx 3.5-4.5 mm long, teeth unequal, 2-3 mm long. Vexillum upto 6 mm long. Fruit 1.8-2.2 x 8.5-9 mm, velutinous 2-seeded.

Specimen studied:Nagarparkar hills, near Maya dam, 24-3-05, *Zamarrud* 685(KUH).

Distributed in India, Pakistan, Arabia and Egypt.

Ecological note: Grows abundantly on rocky area near Maya dam.

Flowering period: September-March.

SESBANIA

Adans., Fam. Pl. 2: 327, 604. 1763; Ali, l. c. 87.

Herbs, shrubs or trees with paripinnate leaves. Flowers in axillary racemes; pedicellate; bracts and bracteoles usually caducous. Calyx usually subequal, 5-toothed. Stamens diadelphous. Ovary with numerous ovules; style curved; stigma capitate. Fruit long, dehiscent, 8-50 seeded.

A genus of c.55 species, distributed in tropical and subtropical regions of the world.

Sesbania sesban (L.) Merrill in Philip. J. Sci., Bot. 7: 235. 1912; Ali,l. c. 89. f. 14. C-D.

Aeschynomene sesban L., Sp. Pl. 2: 714. 1753.

Large shrub, upto 8 m.Rachis 3.5-13 cm long; leaflets 16-50, 7-25 x 3-5 mm, linear-oblong, obtuse. Raceme, axillary, upto 15 cm long; bracteoles c. 3 mm long, coducous. Pedicel c. 12 mm long. Calyx c. 5 mm long, teeth c. 1 mm. Corolla yellow with purple ting ; vexillum upto 14 mm long. Fruit 20-40 seeded.

Specimen studied: Cultivated fields on way to Nagarparkar, c.1.5 m tall, 24-3-05, *Zamarrud* 675 (KUH).

Cosmopolitan in the Old World. Commonly cultivated for fodder.

Ecological note: Found in cultivated area with *ziziphus nummularia, Celosia argentea and Arnebia hispidisima* .

Flowering period: September-Ocoteber

TEPHROSIA

Pers., Syn. 2: 328. 1807. nom conserv, Ali, l. c. 58.

Annual, perennial or shrub with usually imperipinnate leaves. Infloresence a terminal or antiphyllous raceme. Flowers bracteate, bracteole absent. Calyx with subequal lobes. Corolla with externally pilose vexillum. Stamens 10, monadelphous sometimes diadelphous; anthers uniform. Ovary with many ovules; style incurved. Fruit compressed, linear, 2-celled.

A genus of c. 300 species distributed in tropical and subtropical region of the world.

Tephrosia uniflora Pers ., syn . Pl. 2: 329. 1807; Gillett & Ali in Kew Bull. 13: 113. 1958; Ali in Nasir & Ali, l. c. 63.

Perennial, 35-60 cm tall, covered with white silky, pubescent hairs. Leaves c. 2 cm long; petiole 3-8 mm long; leaflets 5-9, 20-35 x 5-8, oblanceolate, elliptic, obtuse, acute. Flowers 2-3 in the axil of the node. Calyx persistent, lobes 4mm, long. Corolla reddish pink, vexillum 5 mm, long hairy outside. Style glabrous or bearded; stigma penicillate. Fruit 7-8 seeded, hairy.

Specimen studied: Nagarparkar near Agha khan hospital, 20-9-2005, *Zamarrud* 813

(KUH).

Species found in Pakistan, India and Arabia.

Ecological note: Quite common occuring plant throughout the region.

Flowering period: February-March, August-November.

VIGNA

Savi in Pisa Nuov. Giorn. Lett. 8:113. 1824; Ali, l. c. 242.

Herb or small shrub , climbing or prostrate with trifoliolate leaves. Flowers in axillary or terminal false raceme or subumbellate cluster. Bracts and bracteole usually deciduous. Calyx with 5-lobed.Stamens diadelphous Ovary with 3-ovules; style filiform; stigma capitate. Fruit linear, oblong. Seeds usually reniform.

A genus of c. 150 species, distributed throughout the tropics of both the world.

Vigna trilobata (L.) Verde in Taxon 17: 172. 1968; Ali, l. c. 244. f. 32. A-E, M.

Dolichos trilobatus L., Mant. 1: 101. 1767.

Annual or perennial herb; stem prostrate, branched, glabrous, rarely pubescent. Leaves trifoliolate with 3-7.6 cm long petiole; leaflets 1-2.5 cm,trilobed, middle bigger than lateral, oblong, spatulate, obtuse; stipules 3.5-15 mm long.Inflorscence a few flowered in raceme with long peduncle, upto 23 cm long; pedicel 2-3 mm long. Calyx 2.5 mm long. Corolla yellow, 4-6.5 mm long. Fruit 6-12 seeded.

Specimen studied: Road side from main bazaar of Nagarparkar, 24-9-2005, *Zamarrud & Alam* 898(KUH).

Species found in Afghanistan, Pakistan, India, Srilanka, Myanmar and Malaysia.

Ecological note: Common in sandy plains.

Flowering period: February-March, August-November.

iii:MIMOSOIDEAE

Usually shrubs or trees. Leaves alternate, generally bipinnate. Flowers in spikes or heads. Sepals 5, free. Petals usually 5, connate. Stamens 10 or numerous, rarely 4. Carpel 1; ovary superior, 1-celled with many ovules. Fruit a lomentum pod.

A subfamily with 64 genera and c. 3000 species, distributed especially in the tropics and warm regions of both the Worlds. Represented by 3 genera in the our area.

KEY TO THE GENERA

1+	Stamens many.....*Acacia*
-	Stamens not more than 10.....2
2+	Anthers eglandular. Pods curved, monoliform.....*Mimosa*
-	Anthers gland erected in early stage. Pods straight, turgid, without segmented valves.....*Prosopis*

ACACIA

Mill., Gard. Dict. Abridg. ed. 4. 1754; Ali in E.Nasir & Ali, Fl. Pak. 36: 2. 1973; M.D. Dassanayake & F. R. Fosberg in M.D. Dassanayake, Fl. Cey (rev.) 1:480. 1980.

Herbs, shrubs mainly trees, spinous with usually phylloidal leaves but not in our species. Flowers in cylinderic, spike or globose head; peduncled, polygamous or bisexual. Sepals and petals 4-5 each, mostly united in 2 whorls.Stamens indefinite. Pod ovate-linear, many seeded.

A large genus of c. 900 species, mainly distributed in tropics and subtropics of the world. Only 3 species are found in our area.

KEY TO THE SPECIES

1+	Inflorescence a spike.....*A. senegal*
-	Inflorescence a head.....2
2+	A large shrub or small tree with many branches at the base. Bark reddish.Ovary glabrous.....*A. jacquemontii*
-	Tree with a single trunk. Bark not reddish.Ovary hairy.....*A. nilotica*

Acacia nilotica (L.) Delile, Fl. Aegypt. Ill 79, 1813; Ali, l. c. 9; M.D. Dassanayake & F. R. Fosberg, l.c.488.

Mimosa nilotica L. Sp. Pl. 521. 1753; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 112. 1966.

Tree, 1.2-18 m tall. Leaves 2-11 pairs of pinnae, sometimes with 1-2 petiolar glands; stipules spine like, 4-8 cm long, surface almost glabrous–subtomentose . Leaflets with 7-25 pairs, 7 x 1.5 mm. Inflorscence axillary, pedunculate. Flowers in heads. Calyx 1-2.5

mm. Corolla yellow, 2-3.5 mm. Fruits 7-11 seeded, indehiscent, curved, glabrous to velvety. Seeds black, smooth.

Specimen studied: Nagarparkar, 2-5 m tall, 17-9-03, *Zamarrud* 345 (KUH); Budhasar, 22-9-2004, *Zamarrud* 823(KUH).

Distributed in Senegal, Sudan, N. Nigeria,Eastern Sudan , Nile Land, Pakistan and India.

Ecological note: Found in the plains having good soil.

Flowering period: September-October.

Acacia senegal (L.) Willd. Sp. Pl. 4: 1077. 1806; Ali, l.c. 6. f. 1. D-F.

Mimosa senegal L., Sp. Pl. 521. 1753.

Small tree, upto 6 m tall. Rachis 2-5 cm long, with glands between upper and lower pinnae and 3 prickles at the base. Pinnae opposite or alternate, 3-5 pairs. Leaflet subsessile, 2-5 x1-1.5 mm, linear, obtuse. Inflorescence a 5-10 cm long spike. Calyx campanulate, 0.8-2.5 mm long, glabrous. Corolla ± 4 mm long. Pods 5-6 seeded. Seeds circular, linear-ovate, smooth, dark brown.

Specimen studied:Karanjhar hills, 22-9-2005, *Zamarrud & Alam* 837(KUH).

Distributed in India, Pakistan, Arabia and tropical Africa.

Ecological note: Found on the slopes and hills with *Euphorbia caducifolia* and *Commiphora wightii* and also in the plains.

Flowering Period: August-January.

Acacia jacquemontii Benth. in Hook., Lond. J. Bot. 1: 499. 1842; Chaudhri & Chuttar, l. c. 112; Ali, l. c. 13. f. 4. D-J.

Small tree or shrub, upto 2.5 m tall with raddish bark and trailing twigs, hairy. Rachis 0.5-5 cm long with spines sometimes glandular at the upper pinnae. Pinnae 1-4 pairs, 5-15 cm long. Leaflets sessile, 5-10 pairs, 2-4 x1-1.5 mm, glabrous, oblong, obtuse. Inflorescence pedunculate, axillary head rarely shortly raceme or umbellate, bracteate. Calyx 1-1.3 mm. Corolla up to 3 mm long. Ovary sessile or stipitate. Pod 5-7.5 x 1-1.7 cm, 5-6 seeded, reticulately veined.

Specimen studied: Nagarparkar, 16-3-2003, *Zamarrud* 205 (KUH).

Grows in India and Pakistan.

Ecological note: Common throughout the region especially in the sandy dry stream beds.

Flowering period: March-May

MIMOSA

L., Sp. Pl. 516. 1753; Gen. Pl. 5.597. 1754; Baker, l. c. 291; Ali, l. c. 25. ; M.D. Dassanayake & F. R. Fosberg, l.c.1:462.

Herb, shrub or small trees usually spinous with bipinnate leaves. Flowers in globose head or cylindric spike; small, sessile. Stamens usually double the number of petals or equal, free, anther small, eglandular.Ovary wtih 2-more ovules. Pod oblong or linear. Seeds ovate or orbicular.

A genus of c. 600 species, mostly distributed in tropics and subtropics of the world. Only one species is found in the area under consideration.

Mimosa hamata Willd., Sp. Pl, 4: 1033. 1806; Ali, l. c. 27. f. 8. C-F.

Shrub, 1.5-2 m tall, prickly , 4-5 mm long, hooked sometimes straight. Leaf pinnae 3-6 pairs, 6.5-25 mm long, rachis 0.7-5.0 cm long, often prickly. Leaflet 6-10 pairs, sessile 3-8 x 1.5-2 mm. Inflorescence globose head, solitary or paired in upper axil. Flowers pink, tetramerous, sessile. Calyx small, c.1 mm long. Corolla tube 2-3 mm long. Stamens 8. Ovary stalked, hairy. Pods flat, surface wavy, prickly, joints 4-8. Seeds reddish brown, ovate, flattened.

Specimen studied: Nagarparkar, Ali 1522(KUH); on way from Nagarparkar to Kasbo, 18-9-03, *Zamarrud* 353 (KUH).

Distributed in India, Pakistan, Afghanistan, Iran and Arabia.

Ecological note: Frequent in Nagarparkar plains.

Flowering period: September-November.

PROSOPIS

L., Mant. 1: 10. 1767; Baker, l. c. 287; Jafri, l. c. 149; Ali, l. c. 28 ; M.D. Dassanayake & F. R. Fosberg, l.c. 468.

Trees armed or unarmed or prickly shrub with bipinnate leaves, leaflets 2-many pairs. Flowers in axillary cylindric spike or globose heads; 5-merous. Stamens 10, free.Pod linear. Seeds ovate.

A small genus of c. 45 species, distributed in tropical and subtropical regions of the world.

KEY TO THE SPECIES

1+	Spines curved upto 6 mm long. Pod 10-12mm broad.....*P.cineraria*
-	Spines straight 1-1.5 cm long. Pod 5-8 mm broad.....*P. juliflora*

Prosopis juliflora (Swartz) DC., Prodr. 2: 447. 1825; Ali, l. c. 31.

Mimosa juliflora Swartz, Prodr. Veg. Ind. Occ. 85. 1788.

A large shrub, upto 5 m tall, glabrous. Leaves alternate, pinnae 1-3 pairs, rachis 1-8 cm long. Leaflets 10-20 pairs, 8x2 mm, entire; stipules 1-1.5 cm long, spiny, paired. Inflorescence a dense, axillary, spike, 3.5-8.5 cm long;peduncle 6-12 mm long. Flowers yellow with green ting.Calyx up to 2 mm long, 5-toothed. Petals, 2-3 mm long. Pod almost erect to semi-circular, 5-8 mm broad , pale yellow, glabrous, pedicel 5-7 mm long. Seeds oblong.

Specimen studied: Nagarparkar, plains, large shrub, 22-9-2005, *Zamarrud* 840 (KUH).

An invasive species, introduced from Mexico and West Indies.

Ecological note: Grows in sandy plains.

Flowering Period: March-September

Prosopis cineraria (L.) Druce in Rep. Bot. Exch. Club. Brit. Isles, 1913, 3: 422. 1914; Ali, l. c. 29. f. 7.

Mimosa cineraria L., Sp. Pl. 2.1500. 1763.

A medium sized tree, upto 5 m tall with prickly branches. Leaves bipinnate, alternate, glabrous, 4-6 cm long, rachis 1-5 cm long; pinnae 1-2 pairs. Leaflets 7-12 pairs, 3-5x2-4 mm, oblong.Flowers creamy white, arranged in 5-12.5 cm long, pedunculate, spike. Calyx infundibular, 5 toothed, 1-1.5 mm long. Petals oblong, 3-4 mm long. Pods slender, turgid, 10-12 mm broad, 10-15 seeded. Seeds oblong, compressed.

Specimen studied: Own- jo- wandio upto 4 m tall, 24-11-02, *Zamarrud & Sarwar* 107 (KUH).

Distribution in India, Pakistan, Afghanistan, Iran and Arabia.

Ecological note: Grows in sandy plains.

Flowering Period: November-March.

Specimen studied: Nagarparkar, Ali 1522(KUH); on way from Nagarparkar to Kasbo, 18-9-03, *Zamarrud* 353 (KUH).

Distributed in India, Pakistan, Afghanistan, Iran and Arabia.

Ecological note: Frequent in Nagarparkar plains.

Flowering period: September-November.

2.3.23. LYTHRACEAE

Herbs, shrubs or trees. Leaves simple, opposite or whorled or alternate. Flowers in cymes or panicles; actinomorphic or zygomorphic. Sepals 3-6. Petals absent or as many as sepals on the rim of hypanthium, free or so. Stamens 4-6, 2-seriate. Carpels 2-4(-6), syncarpous; ovary superior, 2-6-celled, each cell with several ovules. Fruit a membranous capsule.

A family of c.30 genera and c.600 species distributed in the tropics.

AMMANIA

L.Sp. Pl. 119. 1753; Gen. Pl.5. 55. 1754. Dar in Ali & E.Nasir, Fl. Pak. 78: 8. 1975.

Annual, glabrous with minute flowers and opposite or whorled leaves Inflorescences 3-many flowered, axillary cymes, brateolate. Ovary 1-5 celled, enclosed in the hypanthium. Capsule with many seeds, dehiscing irregularly.

A genus of c. 30 species, distributed in the warmer parts of the Worlds.

Ammania baccifera L. Sp. Pl. 120. 1753; Chaudhri & Chuttar, Veg. Rang. Fl. Thar. desert., 104. 1966; Dar, l. c. 9. f. 2. E-F;

An annual, erect, upto 32 cm tall herb.Leaves dense, simple, 1-47 x 0.5-9 mm, lanceolate, ovate.Infloresence a cyme. Flowers sessile-subsessile, hypanthium, 1-2 x 1.5-2.5 mm. Sepals apparently globose with 4 teeth. Style 1, short . Capsule reddish, depressed, globose.

Specimen studied: On the way to Kasbo, 18-9-2004, *Zamarrud, Adil & Abid* 581 (KUH).

Found in most parts of the Asia, Africa, and Australia.

Ecological note: Species grows abundantly during rainy seasons along seasonal streams and water accumulating areas in association with *Cyperus rotundus*, *Amaranthus spinosus* and the grasses.

Flowering period: August-October

2.3.24. MALVACEAE

Herbs, shrubs or trees. Leaves alternate simple with free lateral stipules. Flowers solitary. Epicalyx segments 0-9. Sepals and petals 5 each. Stamens many, monadelphous. Carpels usually 5-many, syncarpous; ovary superior, 5-many celled. Ovules 1-many in each cell. A family of more than 100 genera and c. 2300 species. Tropical and subtropical in distribution and also in temperate regions.

KEY TO THE GENERA

1+	Style branched or unbranched and stigmas as many as carpels.....2
-	Style branches and stigmas twice the number of carpels.....*Pavonia.*
2+	Fruit schizocarpic;carples(mericarp) usually separating.....3
-	Fruit a capsule; carpel not separating.....5
3+	Epicalyx segments present.....*Malvastrum*
-	Epicalyx segments absent.....4
4+	Mericarp not follicular, 1-seeded.....*Sida*
-	Mericarp follicular, 2-9 seeded or rarely 1 by abortion.....*Abutilon*
5+	Epicalyx segments 3, large, leafy, cordate, calyx with oil glands, style 1, seed usually angular or obovoid.....*Gossypium*
-	Epicalyx segments, 5-10, linear to lanceolate, calyx without oil glands, style shortly divided into 5-divergent branches, seeds usually reniform.....6
6+	Calyx 2-3-lobed, irregular, spathaccous, coducous.....*Abelmoschus*
-	Calyx 5 toothed or lobed, regular, not spathaceous, persistent.....*Hibiscus*

ABELMOSCHUS

Medic., Mal. Fam. 46. 1787; Abedin in E. Nasir & Ali, Fl. Pak. 130: 24. 1979. D. Philox in M. D. Dassanayake, Fl. Cey(rev.) 11: 305. 1997; C. Bayer & K. Kubitzki in K. Kubitzki , Fam. & Gen. Vasc. Pl.5. 285.2003.

Herb to undershrub with usually palmately 3-5 lobed leaves. Flowers axillary, solitary or in terminal raceme. Epicalyx segments upto 16, free or connate. Staminal column, antheriferous .Ovary 5-celled. Fruit loculicidal dehiscent capsule.

A genus with c. 10 species, mainly distributed in temperate and warm regions of the world.

Abelmoschus esculentus (L.) Moench, Menth. Pl. 617. 1794; Abedin, l. c. 25; D. Philox, l.c.306.

Hibiscus esculentus L. Sp. Pl. 696. 1753.

Annual herb. Leaves simple, broadly ovate-cordate, 4-30 cm, stiff hairy on both sides; stipules filiform; petiole 4.5-35 cm long. Flowers pedicellate, axillary, solitary. Epicalyx 5-25 x 1-2.5 mm, segments linear-lanceolate, caducous. Calyx 2-3 cm long. Corolla yellow, sometimes pale white with purple spot at base. Staminal column 2-2.5 cm long. Fruit cylindrical, 5 angular.Seeds dark brown-blackish.

Specimen studied: Nagarparkar, Kasbo cultivated fields, 19-9-2004, *Zamarrud* 596 (KUH).

Cultivated in most tropical countries.

Ecological note: Cultivated in most areas of Nagarparker for its young edible fruits while on the hills, grows as an escape.

Flowering Period: February-October.

ABUTILON

Mill., Gard. Dict. Abridg. ed. 4. 1. 1754; Abedin, l. c. 52. D. Philox, l.c.366; C. Bayer &K.Kubitzki, l.c. 293.

Undershrubs, shrubs or rarely small trees with usually ovate, cordate, petiolate, stipulate leaves. Flowers solitary or in terminal raceme or panicles. Epicalyx segments absent. Staminal tube divided at the apex into many anther-bearing filaments. Fruit subglobose, truncated, 2-9 seeded. Seeds ± reniform.

About 150 species, distributed in the tropics and subtropics of both the hemispheres.

KEY TO THE SPECIES

1+	Mericarp 8-11 mm long.....*A. fruticosum*
-	Mericarp 13-16 mm long.....*A. bidentatum*

Abutilon bidentatum A. Rich., Tent. Fl. Abyss. 68. 1847; Abedin, l. c. 63. f. 18 C-D.

Fig.19: *Abutilon bidentatum*: Flower

Erect or spreadingly branched herb or shrub with stellate pubescence. Leaves petiolate, ovate, deeply cordate, 2-16 x 1.5-12 cm, acute–accuminate, serrate, 7-9 veined; stipules filiform 2.5-4 mm long. Flowers with 1.5-4 cm long pedicel. Calyx lobes 5-7 mm long. Petals yellow, obovate, 7-9 x 4-5 mm. Staminal column 2-3 mm long, hairy. Fruits upto 10 mm in diameter, dehiscent; mericarp 3-seeded. Seeds brown, small.

Specimen studied: Between Islamkot to Nagarparker, sandy soil common, flowers yellow, c. 1 m tall. *Qaiser, Ghafoor & Abrar Hussain* 3920 (KUH); Sandy plains in Budhasar, 20-9-2005, *Zamarrud & Alam* 825(KUH).

Distributed in India, Pakistan, Arabia and tropical Africa.

Ecological note: Commonly grows on less saline areas with *A. fruticosum*.

Flowering Period: February-September.

Abutilon fruticosum Guill. & Perr in Guill. *et al*, Fl. Senegamb. Tent 1: 70. 1831; Abedin, l. c. 55. f. 11. A-B. 1979.

Perennial, upto 120 cm tall herb.Leaves sessile, ovate, 0.4-9.5 x 0.3-7 cm, acute; stipules 3-5 mm long, filiform. Flowers yellow, pedicel 0.5-5 cm. Calyx 4-6 x 3 mm, lobes ovate, entire, pubescent outside. Petals 5-7 x 3-4 mm. Staminal column small, glabrous or stellate pubescent. Fruit cylindrical, globose; mericarp 2-3 seeded. Seeds dark brown, hairy.

Specimen studied: Nagarparker hills, 25-10-70, *Qaiser, Ghafoor & Abrar Hussain* 4037(KUH); Near Kalidas dam, 19-9-03, *Zamarrud* 380(KUH).

Distributed in Tropical Africa, Arabia, India and Pakistan.

Ecological note: Quite common in the saline areas in Nagarparker and also occurs on the residual deposits around the hills.

Flowering Period: September-January.

GOSSYPIUM

L., Sp. Pl. 693. 1753; Gen.Pl. 5. 309. 1754. Abedin, l. c. 28. D. Philox, l. c. 315; C. Bayer & K. Kubitzki, l. c. 291.

Herb-undershrub or shrubs with petiolate, palmately lobed leaves. Flowers axillary, solitary; large, showy, pedicellate with 3 large epicalyx segments. Seeds ovoid, usually hairy and in 3-5 loculicidal capsule.

A genus of c. 35 species, distributed in tropical and subtropical regions of the world.

Gossypium herbaceum L., Sp. Pl. 693. 1753; Abedin, l. c. 30.

Annual or perennial herb. Leaves, palmately lobed, 2-5 x 2-5 cm, pubescent above, stellate pubescent below; petiole 2-3.5 cm long. Flowers yellow, 4-6 cm in diameter; pedicellate. Epicalyx segments large, foliacious, cordate at the base.Calyx cupular, toothed, 6-7 mm long, undulatey 5-7 lobed. Petals 2-3.5 x 2.5-4 cm, obovate. Staminal column 1 cm long, antheriferous in the upper half. Fruit oblong or rounded, 2.5-3 cm long and broad. Seeds 5-7 in each cell, hairy.

Specimen studied: Nagarparkar, cultivated fields of okra, 17-9-2005, *Zamarrud & Alam* 736 (KUH).

Cultivated in some warm tropical countries for its fibers and also found as wild.

Ecological note: Found on the Karanjhar hills and the plains.

Flowering period: March-September

HIBISCUS

L., Sp. Pl. 693. 1753; Gen. Pl. 5. 310. 1754. Abedin, I. c. 7; D. Philox, l.c.288; C. Bayer & K.Kubitzki, l.c. 284.

Herbs, shrubs and trees, usually pubescent. Flowers in axillary or in raceme, various in colour. Epicalyx 3-many. Sepals and petals 5 each. Staminal column usually antheriferous throughout or only in the upper half; ovary 5-celled, each cell 3-many ovuled. Styles 5, free above, connate below. Seeds reniform.

A genus of c. 250 species, mainly found in the tropical and subtropical regions of both the hemispheres.

KEY TO THE SPECIES

1+	Profusely branched shrub..... *H. micranthus*
-	Annual, prostrate or semi prostrate herb... *H. aristavalvis*

Hibiscus aristavalvis Garcke, in Bot. Zeit. 7: 849. 1849; Abedin, l. c. 19. f. 4. A-B.

Annual semiprostrate to prostrate herb; stem soft, covered with simple and stellate hairs. Leaves 3-5(-7)lobed, 2-7 cm long, cordate or truncate at the base; obtuse or acute; petiole 2-5 cm long; stipules 1.5-3 mm. Flowers solitary. Epicalyx segments 7-10 , 7-10 x 1-1.5 mm, acute. Calyx 10-15 x 1-3 mm, lobes, lanceolate, ovate, Corolla pinkish-purple, orange, sometimes pale yellow with purple centre; petals obovate, 15-20 x 5-12 mm. Staminal tube 4-6 mm long, antheriferous above the middle. Fruits globose, beaked, hispid at the top. Seeds black, 3-4 in each cell.

Specimen studied: Kalidas dam, 30-80 cm tall, 19-9-03, *Zamarrud* 399 (KUH).

Plant found in tropical Africa, Arabia, India and Pakistan.

Ecological note: Common on sandy areas, and in cultivated fields and also grows on the hills with grasses and *Dipcadi erythraeum.*

Flowering Period: February-September.

Hibiscus micranthus L. f., Suppl. 308. 1781; Abedin, l. c. 15. f. 3. F-G.

Perennial herb, 30-70 cm tall with bristly hairs. Leaves sessile above, petiolate below, simple, alternate, 0.5-1.7 x 0.5-1.5 cm, stellate hairy on both surfaces, elliptic, ovate, acute, dentate; stipules spine-like. Flowers axillary, solitary, pedicellate 0.5-4 cm long,

cylindrical. Epicalyx segments 5, lanceolate or linear 4-8 x 1.2-4 mm . Sepals 5 x 2 mm ,lanceolate. Corolla pink, hairy outside. Fruit globose. Seeds brown, reniform, small.

Specimen studied: Nagarparkar hills, 60-70 cm tall with fruits, *Qaiser & Ghafoor* 4062 (KUH); Nagarparkar, 17-9-03, *Zamarrud* 400 (KUH).

Distributed in Madagascar, Tropical Africa, South Africa, Arabia, Pakistan India, Myanmar and Srilanka.

Ecological note: Grows in shady places on the hills and in the microclimate of *Commiphora wightii*, rarely on sandy places.

Flowering Period: September-October

MALVASTRUM

A. Gray in Mem. Am. Acad. Sc. 11. 4. 21. 1849; Abedin, l.c.89; D. Philox, l.c.333.

Annual or perennial with elliptic-entire lobed or unlobed leaves. Flowers in terminal spike or axillary fascicles, sometimes solitary; bracteate. Sepals and petals 5 each. staminal tube branched at the apex.Ovary 5-many celled, each cell 1-ovuled.Fruit a schizocarp with indehiscent mericarp.

3 species are found in Northern hemisphere, 2 of them are in Southern hemisphere.1 is found in the study area.

Malvastrum coromendelianum (L.) Garcke in Bonplandia 5: 297. 1857; Abedin, l. c. 89. f. 9. C-D.

Malva coromandeliana L. Sp. Pl. 687. 1753

Annual or perennial, 50-60 cm tall herb. Leaves elliptic-ovate, 1-7 x 0.5-4 cm; petioles 0.5-5 cm long, stellate hairy; stipules linear-lanceolate, acuminate, 2-10 mm long. Flowers axillary, solitary or in facicles; pedicel 3-5mm long. Epicalyx segments 3, 3-7 mm long, linear-lanceolate. Sepals 4.5-8 x 1.5-2 mm, acute-accuminate, hairy outside. Petals 4-10 x 4-6 mm, oblique, obovate, hairy at the base. Staminal tube 2-4 mm long, glabrous. Fruits globular; mericarps 7-14, brown-black.

Specimen studied: Kasbo, cultivated fields, upto 50 cm tall, 17-9-03, *Zamarrud* 341KUH).

Found in Tropical regions of both New and Old World.

Ecological note: Common on good drainage soil with large shrubs and annuals.

Flowering period: March-September.

PAVONIA

Cav., Diss. 2. App. 2. 1786; nom. Cons; D. Philox, l.c.326; C. Bayer & K.Kubitzki in C.Bayer and K. Kubitzki, Fam. & Gen . Vasc. Pl.5: 288. 2003.

Herbs-shrubs with petiolate, stipulate, leaves lobed or unlobed. Flowers usually axillary, solitary or in raceme or panicles. Styles double the number of carpels. Staminal tube bears numerous filaments.

A genus of c. 200 species, distributed in warm regions of both the hemispheres. Following species grows in Nagarparkar.

Pavonia zeylanica (L.) Cav., Diss. 3: 134. t. 48. f. 2. 1787; Abedin, l. c. 66; in Fl. Pak. l. c. 98. f. 23. B.

Undershrub, almost hispid and long simple hairy.Leaves trilobed, upper one entire; stipules filiform, 3-5 mm long, petiole 4-4.5 cm long. Flowers axillary, solitary; pedicel 2-4 cm long with a joint above the centre. Epicalyx segments 8-11, filiform, free, hairy, 10-13 mm long. Calyx 4-6 mm long; sepals connate at the base. Corolla 1-1.5 cm long, yellow,drying pink. Fruits globose, hairy; mericarps 5, winged 4 mm broad. Seeds reniform, dark brown.

Specimen studied: Kalidas dam, 30 cm tall, 17-9-03, *Zamarrud* 348 (KUH).

Distributed in Tropical Africa, Arabia, Pakistan, India and Srilanka.

Ecological note: Common in the plains, grows in association with *Zaleya pentandra, Corchorus trilocularis, Corchorus aestuans, Acacia nilotica* and *Prosopis cineraria*. Rare on the hills.

Flowering period: March-September.

SIDA

L., Sp. Pl. 683. 1753; Gen. Pl. 5. 306. 1754; Abedin, I. c. 76; D. Philox, l.c.347; C. Bayer & K.Kubitzki, l.c. 296

Herbs-undershrubs. Leaves alternate, stipulate, lobed usually pubescent with long petiole. Flowers axillary, solitary or in raceme or panicle. Epicalyx usually absent. Carpels 5-14.

A genus of c. 150 species, distributed in the tropics and subtropics of both the hemisphere. Most of them are found only in America.

KEY TO THE SPECIES

1+	Corolla upto 2o mm across no. of mericarps 5, small.....*S.cordata*
-	Corolla upto 8mm across no of mericarp 7-8, large.....*S. tiagii*

Sida cordata (Burm.f.) Bross. in Blumea 14 (1): 182. 1966; Abedin, l. c. 78 .f. 21. E; D. Philox, l.c.349.

Melochia cordata Burm. f. Fl. Ind. 143. 1768.

Perennial herb, semi prostrate, 40-80 cm long; stem semiwoody, branched, stiff hairy. Leaves ovate, lanceolate, 1-6.5 x 0.5-6.4 cm, acute, acuminate, cordate, stellate pubescent below, stellate strigose above; stipules lanceolate, filiform, 1-4 mm long; petioles 0.5-4.5 cm long. Flowers with 1.5-2.5 cm long pedicel, axillary, solitary. Calyx lobes 5, fused to the middle, 5 x 3 mm, hirsute outside. Corolla yellow, 5-8 mm glabrous.Staminal tube 1.5-3 mm long. Fruit depressed, globose 3-4 mm; mericarps 5, pubescent, 2.5 mm long. Seeds brown, oblong, glabrous.

Specimen studied:Nagarparkar, Rangers Check Post, 18-9-03, *Zamarrud* 359 (KUH).

Distributed in Tropical and subtropical regions of both the Worlds.

Ecological note: Grows in sandy plains with *Convolvulus prostratus, Cenchrus penicetiformis, Cenchrus ciliaris* and *Vigna trilobata*.

Flowering period: March-September.

Sida tiagii Bhandari in Ann. Arid zone 16: 455. 1977.

Sida pakistanica Abedin in Pak. J. Bot. 11(1):55.1979; in Fl. Pak. l. c. 87. f. 21, A-B.

Undershrub, upto 46 cm tall, pubescent; stem branched, lower branches prostrate. Leaves oblong-ovate or elliptic, 1-4 x 0.5-3cm, obtuse, margin serrate-crenate; petiole 5-15 mm long; stipules filiform sometimes linear. Flowers axillary, solitary, yellow; pedicellate. Calyx 6-10 mm long, connate part angular, lobes deltoid, 5-7 mm, acuminate. Corolla 1.5-2 cm across. Fruits depressed, globose; mericarp 7-8, 3-4 mm, sometimes more reticulate, glabrescent, indehiscent. Seeds dark brown.

Specimen studied: Nagarparkar cultivated fields, 24-9-2005, *Zamarrud* 885 (KUH).

Distributed in India, Pakistan and Arabia.

Ecological note: A common species of the plains and foot hills.

Flowering period: March-September.

2.3.25. MELIACEAE

Shrubs or trees. Leaves alternate, usually 1 or 2 pinnately compound. Flowers in panicle cyme. Stamens usually 8-10 , monadelphous. Carpels 2-6 or more, syncarpous; ovary as many celled as number of carpels, each cell with 2 ovules. Fruit a capsule, berry or a drupe.

A family of more than 50 genera and c. 600 species of tropical and subtropical distribution.

KEY TO THE GENERA

1+	Leaves pinnate.Drupe 1-seeded.....*Azadirachta*
-	Leaves usually bipinnate.Drupe 3-6 seeded.....*Melia*

AZADIRACHTA

Adr. Juss. in Mem. Mus. Par. 19: 220. 1830; Abdulla in E.Nasir & Ali, Fl. Pak. 17: 5. 1972.

Trees with pinnate leaves and serrate, oblique leaflets. Flowers in axillary panicles. Sepals and petals 5 each. Stamens 10, monadelphous; anthers sessile.Ovary 3-celled with 2-ovules each; stigma 3-fid. Fruit a drupe.

A small genus with 2 species, chiefly found in South and SE Asia and cultivated throughout the Old World. Represented by the following species in our region.

Azadirachta indica Adr. Juss. in Mem. Mus. Par. 19. 221. 1830; Abdulla, l.c. 5: 17.f. 1. C-E.

An ever green tree upto 15 m tall, glabrous. Leaves imparipinnate with pulvinus base. Leaflet alternate or opposite, 2-7 x 1-4 cm, ovate, elliptic. Flowers axillary, pale white. Sepals obovate, 1.5 mm long, puberulous, imbricate. Petals 5-6 mm long, obovate, oblong. Staminal tube c. 5 mm long, puberulous; anthers oblong. Style linear. Drupe 1-seeded, oblong, yellowish green.

Specimen studied: Nagarparkar, sandy desert, 24-3-2005, *Zamarrud & Alam* 683(KUH).

A native of India and China now cultivated throughout Pakistan and also naturalized.

Ecological note: Naturalized throughout the plains of Nagarparkar with *Acacia nilotia, Prosopis cineraria, Ziziphus nummularia, Grewia tenax* and *Calotropis procerra.*

Flowering period: March-June

MELIA

L., Sp. Pl. 384. 1753; Gen.Pl.5 182. 1754; Abdulla, l. c. 7.

Trees usuallywith bipinnate leaves and serrate leaflets. Flowers in axillary panicles; small. Sepals 5-6, fused. Petals 5-6, free. Stamens 10-12, monadelphous. Disc present, annular; ovary 3-6 celled. Stigma capitate. Fruit a drupe .

A genus with c.15 species widely distributed throughout the warmer parts of Asia and Australia. Represented by the following species in our region.

Melia azedarach L., Sp. Pl. 1: 384. 1753; Abdulla, l. c. 7

Medium sized deciduous tree upto 10-15 m tall. Leaves 2-3 pinnate, up to 60 cm long. Leaflets opposite, elliptic 20-50 x 5-19 mm, serrate-subserrate. Pedicel 2-3 mm long, puberulous. Flowers small. Calyx lobes small. Petals 5.5-9 mm long, spatulate to lanceolate . Staminal tube 5-7 mm long, 10 striate baselly. Style 4-5 mm long. Fruit globose, 3-6 seeded.

Specimen studied: Nagarparkar, 14-9-2004, *Zamarrud* 557(KUH).

It is a subhimalyan species, now cultivated in many parts of warm regions of Asia including Pakistan.

Ecological note: Grows in the plains with *Acacia nilotica, Prosopis cinerarea, Ziziphus nummularia* and *Grewia tenax*

Flowering period: March-June

2.3.26. MOLLUGINACEAE

Annual to perennial herbs with usually opposite leaves. Flowers solitary or in cyme. Petals absent. Stamens 3-20. Carpels 1-5, syncarpous; ovary superior, 1-5 celled. Fruit a capsule.

A small family with c.13 genera and 130 species, distributed in tropical and warm regions, particularly in Africa.

GLINUS

L., Sp. Pl. 463. 1753; Gen. Pl. 5. 537. 1754; Y.J. Nasir in E. Nasir & Ali, Fl. Pak. 40: 1. 1973.

Leaves opposite with cluster of flowers in axillary cymes; subsessile. Petaloid staminodes many. Stamens 5-12. Ovary 5-celled.

A genus of c. 12 species, found in tropical and sub-tropical regions.

Glinus lotoides L., Sp. Pl. 463. 1753; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 80. 1964; Y.J. Nasir, in E.Nasir & Ali, l. c. 1. f.1. A-D.

Procumbent annual upto 25 cm tall, covered with stellate. Leaves simple, opposite, 9-12 mm across, suborbicular, obovate; petiole 1-6 mm long. Inflorscence terminal,cluster. Calyx 5, persistent, 3-5 mm, hairy outside. Staminode 15, white.Ovary ovoid. Fruit sub-globose.Seeds many, minute

Specimen studied: Nagarparkar, foot hills, 17-9-2003, *Zamarrud* 340 (KUH).

Species found mostly in warmer regions of the world.

Ecological note: Found spreading in dry ponds and dam often with *Coldenia procumbens.*

Flowering period: March – April.

2.3.27. MORINGACEAE

Usually trees with alternate, large, 2-3-pinnate leaves. Flowers in dense, axillary panicles; zygomorphic. Sepals 5, connate below. Petals 5, free, unequal.Stamens 5, alternating with staminodes. Carpels 3, syncarpous;ovary superior, 1-celled , ovules many. Fruit an elongated pod. Seeds large, with or without 3 wings.

A unigeneric family with more than 10 species distributed in Africa and Asia.

MORINGA

Rheede ex Adans., Fam. Pl. 2: 318. 579. 1763; Qaiser in E.Nasir & Ali, Fl. Pak. 38: 1. 1973; K. Kubitzki in C.Bayer & K. Kubitzki, Fam. & Gen.Vasc. Pl. 5: 312. 2003.

A genus of more than 10 species found in the Old World.Following species is found in the study area.

Moringa concanenses Nimmo ex Dalz. & Gibs., Bomb. Fl. 311. 1861; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 114. 1964; Qaiser, l. c. 3. C

Trees, upto 5 m tall. Leaves bipinnate 15-45 cm long;leaflets 1-3.8 x 1.25-2.5 cm, ± orbicular, 4-6 pairs with articulated, petiolule c.3.0 mm long. Inflorscence lax, panicles upto 15 cm long. Flowers small; pedicel accrescent upto1.3, cm in fruits, deflexed; bracteate. Sepals oblong, white, reflexed, 8.5-12.5 mm long. Petals yellow with red or pink veins, oblong or oblong- spatulate, c. 9 mm. Stamiodes 4-5. Pod linear, triangular, c.45 cm long. Seeds triangular, winged, white, or pale, yellow.

Specimen studied:Nagarparkar town near the tample, tree c. 4 m, tall,leaflets 1-1.5x 0.5-1.5 cm, ± orbicular, found rare, 24-3-05, *Zamarrud* 673(KUH).

Distributed in India and Pakistan (Nagarparkar).

Ecological note: An important species of Karanjhar hills in Nagarparkar.

Flowering period: October-March.

2.3.28. NYCTAGINACEAE

Herbs to small trees, dichotomously branched. Leaves simple, alternate or opposite. Flowers in cyme usually subtended by foliacious and coloured bracts. Sepals 4-5. Petals absent. Stamens 1-many, Carpel 1; ovary superior, 1-celled, 1-ovuled. Fruit a nut.

A family of c. 30 genera and c. 400 species distributed in tropical and warm regions, mainly in America.

BOERHAAVIA

L., Sp. Pl. 3: 1753; Gen. Pl. 5. 119. 1754; Y.J.Nasir, in Nasir & Ali, Fl. Pak. 115: 3. 1977.V. Bittrich & U.Kuhn in K. Kubitzki, Fam. & Gen. Vasc. Pl.11:481. 1993.

Perennial herb with glandular, opposite leaves. Flowers in capitate or paniculate racemes; bracteate, sessile or pedicellate. Perianth 5-lobed. Stamens 1-5.Ovary stipitate. Fruit small, enclosed in the perianth tube

A genus of c. 50 species, found in tropical to subtropical parts and S. Europe and S. United States. Only one species is reported from our region.

Boerhaavia repens L., Sp. Pl. 3. 1753; Y.J. Nasir, l.c., 7.

Perennial, spreading upto 80 cm. Leaves simple, 0.5-5x0.2-3.8cm, ovate, oblong-subcordate. Flowers in axillary cyme; bracts and bracteole ovate with membranous margin. Perianth campanulate, pinkish-mauve. Stamens 2-3. Ovary ovoid. Nut small.

Specimen studied: Nagarparkar, 20-11-2002, *Zamarrud* 80(KUH); Karanjhar hills, 20-3-2003, *Zamarrud* 243(KUH); Nagarparkar, 18-9-2003, *Zamarrud* 367(KUH); Ranpur, 15-9-2004, *Zamarrud* 568 (KUH); Nagarparkar, 22-3-2005, *Zamarrud* 654(KUH).

Species found in Tropical Africa and Asia

Ecological note: Fairly common in the hills and plains, grows in association with *Amaranthus viridis, Cleome brachycarpa* and *Gynandropsis gynandra*. Often seen within the clumps of *Euphorbia caducifolia*.

Flowering period: Almost round the year.

2.3.29. OROBANCHACEAE

Annual to perennial, herbs with parasitic, tuberous roots and scaly or fleshy, alternate leaves. Flowers in cymes or spikes; zygomorphic. Sepals 4-5. Corolla bilabiate. Stamens 4, didynamous. Carpels 2-3, syncarpous; ovary superior, 1-celled, many ovuled. Fruit a loculicidal capsule.

A family of c.15 genera and more than 200 species, distributed in the temperate and subtropical regions of the Old World and also found in the North hemisphere.

CISTANCHE

Hoffmg. & Link, Fl. Port. 1: 318, t. 63. 1809; Jafri in E.Nasir& Ali, Fl. Pak. 98: 5. 1976.

Flowers arranged in large spike; bracteate with usually 2-bracteole. Calyx tubular, 4-5 lobed. Corolla with subequal , 5-lobed. Stamens subexserted. Seeds subglobose.

A genus of c. 15 species in Afro – Asian region; Represented by single species in our region.

Cistanche tubulosa (Schrenk) Hook. f., Fl. Brit. Ind. 4: 324. 1884; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 116. 1966; Jafri in Ali & Nasir, l.c. 5. f. 1. F-I. 1976.

Phelypaea tubulosa Schrenk, Pl. Spec. Aegypt-Arab. 23. 1840.

Stem erect, upto 150 cm tall, yellow-brownish. Scales 1-4 x 0.4-2 cm, broadly linear or triangular, acute. Calyx tubular-campanulate, 14-18 mm long. Corolla yellow with purple ting, tubular, tube long, narrow. Fruits ovoid-oblong, compressed, beaked, many seeded. Seeds small, dark brown.

Specimen studied: Kasbo cultivated fields of *Capsicum annum*, upto 30 cm long, 24-3-2005, *Zamarrud* 663 (KUH).

Distribution N. Africa, Arabia, W. Asia to Pakistan, India and C. Asia.

Ecological note: Parasite on the roots of *Prosopis cineraria* and *Calotropis procera*.

Flowering period: August - September

2.3.30. OXALIDACEAE

Usually herbs with tubers or bulbs. Leaves digitately 3-foliolate.Flowers usually solitary or subumbellate. Sepals and petals 5. Stamens 10, connate at the base, in two whorls. Carpels 3-5, syncarpous; ovary superior, 3-5 celled, ovules 1-2 in each cell, Fruit a loculicidal capsule or berry.

A family of c. 6 genera and c. 900 species, distributed in tropical and subtropical regions.

OXALIS

L., Sp. Pl. 433. 1753; Gen. Pl. 5. 198. 1754; Y. J.Nasir in E.Nasir. & Ali, Fl. Pak. 4: 1. 1971; A. A.Cocucci in K.Kubitzki, Fam. & Gen. Vasc. Pl.6.288. 2003.

Flowers solitary; regular. Stamens monadelphous; filaments alternating long and short to each other. Ovary 5-celled with 1-many ovules in each cell; hetrostylous. Fruit a capsule.

A large genus comprising of c. 800 species, distributed in New World and S. Africa.

Oxalis corniculata L. Sp. Pl. 435. 1753; Y. J.Nasir, l. c. 2. f. 2. A - C.

Creeping herb with 3-15 x 6-32 mm, leaflets. Flowers 2-5 arranged in axillary umbels or solitary; pedicel, upto 15 mm long. Sepals 5, linear-lanceolate, hairy. Petals 5, yellow. Carpels 5, pubescent. Capsule upto 2.5 cm long, pubescent. Seeds ribbed, 1 – 1.5 mm long.

Specimen studied: Nagarparkar,Own-jo-wandio cultivated field, 24-3-05, *Zamarrud* 679(KUH).

A cosmopolitan weed.

Ecological note: Frequent on sandy saline areas. Common near water channels in cultivated fields.

Flowering period: March – December.

2.3.31. PEDALIACEAE

Annual to perennial herbs. Leaves simple, opposite or the uppermost alternate. Flowers solitary, axillary, zygomorphic. Sepals and petals 5 each. Stamens 4. Carpels 2, syncarpous; ovary superior, 2-4 celled, each with 1-many ovules. Fruit a capsule.

A family of c.17 genera and c.85 species, mostly coastals or desert plants of tropics or subtropics of the Old World.

KEY TO THE GENERA

1+	A diffused succulent, spreading annual fruit an indehiscent- fruit a loculiaidal carpels.....*Pedalium*
-	An erect upto 65 cm tall annual.....*Sesamum*

PEDALIUM

L., Syst. Nat. ed. 10: 1123. 1759; Abedin in E.Nasir & Ali, Fl. Pak. 33. 1973;William L.,Thobald & Donald, A in M. D. Dassanayake & F. R. Fosberg, Fl. Cey(rev.) 3: 322. 1981.

Annual herb with opposite or alternate leaves. Flowers axillary, solitary. Stamens free, didynamous. Ovary 2-celled each with 1-2 ovules.

A genus of single species, distributed in Ttropical Africa, Madagascar and Tropical Asia.

Pedalium murex L., Syst. Nat. 10:1123. 1759; Abedin, l. c. 33: 1. f. 1.E-H.1973. William L.,Thobald & Donald, A., l.c.322.

Much branched, upto 60 cm spreading, annual herb, succulent, glandular hairy. Leaves 1-4.5 x 0.5-3.5 cm, ovate or oblong. Flowers yellow. Calyx persistent, 2 mm long. Corolla tubular, tube 1-3 cm long, lobes obtuse. Fruits indehiscent, pyramidal, 2-4 seeded. Seeds oblong

Specimen studied: Nagarparkar, 24-10-70, *Qaiser & Ghafoor* 3946 (KUH); Near Kalidas dam 15-9-2003, *Zamarrud* 306 (KUH);

Species found in Pakistan, India, Srilanka and tropical Africa.

Ecological note: An Indian element, common in plains with *Lycium edgworthii* and *Acacia nilotica* near water channels while on the hills it is infrequent.

Flowering period: February-October

SESAMUM

L., Sp. Pl. 634. 1753; Gen. Pl. 5. 282. 1754; Abedin, l .c. 3; William L.,Thobald & Donald, A., l.c.324.

Annual or perennial erect herb with opposite or alternate leaves. Flowers white or sometimes showy. Stamens 4 or 2; Ovary 4- celled. Fruit loculicidal capsule.

A genus of c. 30 species, mainly found in Asia, Tropical and South Africa.

Sesamum indicum L., Sp. Pl. 634. 1753; Abedin, l. c. 3. f. 1. A-D; William L.,Thobald & Donald, A., l.c.325.

S. orientalis L., Sp. Pl. 634. 1753.

Annual, herb with erect stem, upto 65 cm tall, puberulous. Leaves simple, lobed or 3-partite 3-18x5-4 cm; petiole 0.5-12 cm long. Flowers white; bracteate. Calyx lobes linear-lanceolate, hairy. Petals 1.9-3 cm long, pubescent, obtuse. Capsule oblong, winged, many seeded. Seeds black, brown, smooth, pyriform.

Sesamum indicum Widely cultivated in many countries.

Specimen studied: Nagararkar hills, 24-3-2005, *Zamarrud* 674(KUH).

Ecological note: A cultivated species but found wild (escape) at the top of the hills and the slopes.

Flowering period: February-October.

2.3.32. POLYGONACEAE

Herbs, trees or climbers. Leaves alternate, simple, stipules ochreate. Flowers in cymes, spike, heads or panicles.Perianth segments 3-6, 1 or 2-seriate. Stamens 4-many. Carpels 2-3, syncarpous; ovary superior, 1-celled, 1-ovuled. Fruit usually a trigonous nut.

A family of c.55 genera and c.1150 species, mostly distributed in temperate region particularly in the Northern hemisphere.

KEY TO THE GENERA

1+	Perennial.Leaves linear.Stamens 15.....*Calligonum*
-	Annual.Leaves ovate-oblong.Stamens 6.....*Rumex*

CALLIGONUM

L., Sp. Pl. 530. 1753; Gen. Pl. 5.235.1754;Qaiser in Ali & Qaiser, Fl. Pak. 205: 174. 2001.

Diffusely branched shrub with linear-filiform, free or fused leaves, sometimes absent. Flowers loose clustered or solitary. Perianth segments 5, ± petaloid. Stamens 15, connate. Ovary tetra angular. Fruit nutlet, coiled or straight.

A genus of c. 80 species, found in Asia, Africa and S. E. Europe.

Calligonum polygonoides L., Sp. Pl. 530. 1753; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert,131:1966; Qaiser, l. c. 177.

Shrub, upto 1.5 m tall, branched, glabrous. Leaves sessile , 7-15 mm long, linear, scanty, caducous. Flowers: pedicel 3-8 mm long. Perianth segments 3-4 x2-3 mm, oblong, white, reflexed. Nuts densely setose, tetragonus , oblong with broad winged.

Specimen studied: Nagarparkar, 19-11-2002, *Zamarrud* 1(KUH); Nagarparkar sandy desert, 22-9-2005, *Zamarrud* 836 (KUH).

India, Pakistan and adjoining countries toward the West

Ecological note: Found abundantly on sandy plain and mounds with *Leptadenia pyrotechnia, Euphorbia caducifolia* and, *Calotropis procera,* but infrequent on the hills. Flowering period: September – October.

RUMEX

L., Sp. Pl. 333. 1753;Gen. Pl. 5. 156.1754; D. Philox in M.D.Dassanayake, Fl.Cey(rev.) 11:390.1997; Qaiser, I. c. 136.

Herb-shrub with alternate basal and cauline leaves; ochreae tubular. Flowers in clusters. Perianth segments 3 in 2-series, unequal. Stamens 3 in 2-series. Fruit nutlet (trigonous).

A genus of more than 200 species, distributed mainly in temperate regions of Northern regions of both the Worlds.

Rumex dentata L., Mast. 11: 226. 1771.

ssp.***Klotzschianus*** (Miesu.) Rech. f. in Beih. Bot. Centrbl. 49. 1932; Qaiser, l. c. 158.

Branched or unbranched, annual herb, 20-60 cm tall.Leaves ovate- oblong at the base, usually truncate; cauline leaves few, small with short petioles. Flowers in whorls. Perianth wall 2.5-3.5 mm long .Ovary triangular. Nut small.

Specimen studied: Nagarparkar sandy plains, 20-3-2003, *Zamarrud* 250(KUH); 24-9-2004, *Zamarrud* 899 (KUH).

It is found in Afghanistan, Pakistan, India and East Asia.

Ecological note: Grows in the plains and rarely on the hills.

Flowering period: March – September.

2.3.33. PORTULACACEAE

Usually succulent herbs with opposite or alternate scarious leaves. Flowers in racemes or cymes or glomerules. Sepals 2, deciduous. Petals 4-6, free or connate. Stamens 4-many. Carpels 2-3, syncarpous; ovary 1-celled, superior or half superior, ovules 1-many. Capsule longitudinal or circumscissle dehiscent.

The family is of worldwide distribution and consists of c. 32 genera and c.380 species.

PORTULACA

L. Sp. Pl . 445. 1753;Gen. Pl.5. 204. 1754; Ghafoor in E. Nasir & Ali, Fl. W.Pak. 51: 3. 1973.

Annual or perennial, with terminal solitary or clustered flowered. Calyx adnate to ovary. Stamens 7-20; style 3-8 fid. Capsule dehiscing transversely.

A genus of c. 100 species mostly found in America.

Portulaca oleracea L. Sp. Pl. 445. 1753; Ghafoor, l. c. 3.

Erect or prostrate, annual or perennial herb, upto 25 cm tall. Stem succulent. Leaves obovate-oblong, linear-oblong, white below and purplish-green above.Inflorescence 3-6 flowered cyme. Flowers yellow; bracts membranous, ovate. Sepals inserted into a tube , deciduous. Petal 5, obovate, 4-6 x 2-3 mm, mucronulate. Stamens 7-12.Ovary ovoid. Fruits many seeded. Seeds black, reniform.

Specimen studied: Budhasar and Nagarparkar, 18-9-2004, *Zamarrud* 588a, 588b (KUH).

A cosmopolitan species of cultivated fields.

Ecological note: Species found on the wet sandy plains and near cultivation with *Convolvulus prostratus. Amaranthus viridis* and *Cucurbitaceous* spp.

Flowering period: July-September.

2.3.34. PRIMULACEAE

Annual, perennial herbs with simple leaves. Flowers in panicle, umbels, racemes, spikes or solitary; pentamerous. Carpels syncarpous; ovary superior or half superior, 5-10 celled, each cell 1-ovuled. Fruit a pyxidium.

A family of c.25 genera and c.1000 species, subcosmopolitan in distribution mainly in Northern hemisphere.

ANAGALIS

L. Sp. Pl. ed. 1. 148. 1753; Gen. Pl. 5: 73. 1754; Y.J.Nasir in E. Nasir & Ali, Fl. Pak. 157:93. 1984.

Herb or undershrub with opposite or alternate leaves. Flowers solitary axillary.Calyx and corolla 5-lobed each. Filaments bearded. Pyxidium globose, operculate.

A genus of c. 28 species, found throughout the world, mainly in North and tropical Africa.

Anagalis arvensis L., Sp. Pl. 1. 148. 1753; Y. J. Nasir, l. c. 94.

Annual herb; stem angular, erect-decumbent or procumbent. Leaves sessile, 10-16 x 7-12 mm, opposite –decussate, ovate-oblong, obtuse, surface with dotted glands, margin slightly papillose. Flowers pedicellate. Calyx campanulate, lobes ovate-lanceloate, margin ciliolate. Corolla lobes blue, rotate, obovate, glandular hairy. Capsule globose. Seeds trigonal, dark.

Specimen studied: Own jo wandio cultivated field near Nagarparkar, 22-3-2005, *Zamarrud & Alam* 657(KUH).

A cosmopolitan weed .

Ecological note: Common near areas of cultivation with *Chloris barbata* and *Oxalis corniculata.*

Flowering period: March-April.

2.3.35. RHAMNACEAE

Trees or shrubs, rarely climbers. Leaves simple, alternate, stipulate. Flowers in axillary cymes; perigynous. Sepals 5, rarely 4 or 6. Petals 5, rarely 4 or 6, cucullate. Stamens usually 5, rarely 4 or 6, antipetalus. Carpels 2-3, or sometimes upto 5, syncarpous; ovary

superior or inferior, usually 2-3 celled, each with 1-ovuled. Fruit often drupaceous or capsule.

A family of c. 60 genera and c.900 species, distributed in tropics and subtropics of both the hemisphere.

ZIZIPHUS

Mill., Gard. Diet. ed. 8. 1768; Qaiser & Nazimuddin in E.Nasir & Ali, Fl. Pak. 140: 9. 1981.

Shrubs or trees, with stipular spines, one usually long and straight and other short and recurved. Leaves alternate, serrulate .Flowers clustered in axillary cymes; small, regular, 5-merous; disc 5-lobed. Calyx cup-shaped, petals clawed, hooded. Stamens 5. Ovary seated on the disc, 1-2 celled, style 2-lobed. Drupe oblong, black.

A genus of c. 100 species, distributed in both tropical regions of the worlds.

Ziziphus nummularia (Burm. f.) Wight & Arn., Prodr. Fl. Penins. Ind. Or. 162. 1834; Chaudhri & Chuttar, Veg. Rang.Fl. Thar desert, 133. 1966; Qaiser, l. c. 12. f. 1981.

Rhamnus nummularia Burm. f., Fl. Ind. 61. 1763.

Flexuous branched, spiny shrub, tomentose, Leaves ovate to elliptic, pubescent 1-2x0.5-2 cm, entire or serrulate; petiole 2-5 mm long. Flowers campanulate, pale yellow. Calyx lobes 1.5 mm, ovate, lanceolate, pubescent. Petals cuneate. Drupe globose, 5-10 mm across, reddish, 2-seeded.

Specimen studied: Own jo wandio cultivated field near Nagarparkar, 22-3-2005, *Zamarrud & Alam* 659(KUH); Adhagam, 9-9-2007, *Zamarrud & Perveen,* 912(KUH); Budhasar, 9-9-2007, *Zamarrud* 914 (KUH); Ranpur, 9-9-2007, *Zamarrud* 915(KUH.

Distributed in India, Pakistan and Iran.

Ecological note: A common plant of plains, grows with *Prosopis cinerarea, Acacia nilotica, Acacia senegal , Aerva javanica and Leptadenia pyrotechnica* and less frequent on the hill slopes

Flowering period: round the year.

2.3.36. RUBIACEAE

Usually trees, shrubs or climber. Leaves simple, opposite or whorld with inter-or intra-petiolar stipules, Flowers in cymes, heads or in corymbose cymes. Sepals and petals 4-5 each. Stamens 4-5, free, epipetalous. Carpels usually 2 or sometimes 4, syncarpous; ovary inferior, 2-4 celled. Fruit a capsule or sometimes a berry.

One of the largest families with c.630 genera and c.10200 species of cosmopolitan distribution, mainly in tropical and warm regions. There is only 1 genus in our area.

BORRERIA

G. F. Mey., Prim. Fl. Esseq. 79. t. 1. 1818 (nom conserv.); Nazimuddin & Qaiser in E.Nasir & Ali, Fl. Pak. 190: 93. 1989.

Annual or perennial, prostrate sometimes erect with tetragonal stem. Leaves opposite, fascicled verticillate, sessile or shortly petiolate, stipulate. Flowers in axillary or terminal head. Sepals 2-4 lobed. Petals 4-lobed, salverform. Carples 2, fused. Stamens 4. Fruit septicidal capsule.

A genus of c.150 species, mainly occur in warm and temperate regions of the world.

Borreria articularis (L.f.) F.N. Williams in Bull. Herb. Boiss. 2. ser. 5: 956. 1905; Nazimuddin & Qaiser, l. c. 96.

Spermacoce articularis L. f., Suppl. 119. 1781.

Perennial, erect-procumbent, branched, herb.Leaves sessile, 1.5-3 x 0.8-1.5 cm, elliptic-lanceolate; stipules hairy. Inflorscence few flowered head, axillary. Flowers sessile. Calyx lobes 1.5-2 mm long, linear-lanceolate. Corolla pink-blue, tube 8-12 mm, throat hairy; lobes elliptic. Ovary 2-celled, 2 ovules in each locule. Fruits hairy, ovoid or ellipsoid. Seeds brown, oblong-ellipsoid, grooved.

Specimen studied: *Abedin, Ali & Faruqi* 4455, 4512(KUH). Nagarparkar, 18-9-2003 *Zamarrud* 353 (KUH); 24-3-2005, *Zamarrud* 675 (KUH); Karanjhar hills, 24-9-2005, *Zamarrud* 904(KUH).

Species found from Srilanka to Singapore through India, Pakistan, China and Malaysia.

Ecological note: An Indian element, common of sandy plains grows with *Zaleya pentandra*, *Euphorbia hirta*, *Amaranthus* and *Cucurbitaceous* spp. and rarely found on

the hills.

Flowering period: July – September.

2.3.37. SALVADORACEAE

Trees or shrubs.Leaves simple, opposite. Flowers in terminal clusters or panicles; bisexual or unisexual. Sepals 2-5,free. Petals usually 4, rarely 5, free. Stamens 4, rarely 5, alternating with the petals. Carpels 2, syncarpous; ovary superior, 1-2 celled. Fruit a berry or drupe.

A small family with 3 genera and c.12 species, distributed in the tropics of Asia and Africa. Represented by a single genus in our region.

SALVADORA

L., Sp. Pl. 122. 1753; Gen. Pl. 5:58.1754; Qureshi in E. Nasir & Ali,Fl. Pak. 29: 1. 1972.

Shrubs, usually unarmed with simple, opposite leaves. Flowers in axillary and terminal panicles; bisexual. Calyx & corolla 4-lobed each. Stamens 4.Ovary 1-celled with 1-basal ovule.

A small genus of c.4 species, found in Pakistan, India, Srilanka and Africa.2 species are found in Nagarparkar.

KEY TO THE SPECIES

1+	Leaves not succulent, elliptic-ovate with 5-6 pairs of lateral nerves.Sepals less than half the length of petals. ..... *S. oleoides*
-	Leaves succulent, elliptic-lanceolate with indistinct lateral nerves.Sepals more than half the length of petals. ..... *S. persica*

Salvadora oleoides Decne. in Jacquem., Voy. Bot. 139. t. 144. 1844; Qurashi, l. c. 3. f. 1. A-D.

Small tree, upto 3 m tall. Leaves elliptic-lanceolate, 2.0-7.5x0.4-1.5, acute. with 1-2 mm long petiole. Inflorescence axillary, panicles or branched spike, 2.4-5 cm long. Flowers greenish white. Sepals c. 2 mm long. Petals 2.5 mm long. Fruit a drupe, edible. Seeds erect, globose.

Specimen studied: Nagarparkar, shrub upto 8 ft tall, 18-3-03, very common plant of the desert, *Zamarrud & Sarwar* 213 (KUH).

Distributed in West Pakistan, India, Arabia and Aden.

Ecological note: Grows in less saline plains.

Flowering period: March-June.

Salvadora persica L. Sp. Pl. 122. 1753; Qureshi, l. c. 1. f. E-G.

A medium sized tree or large shrub; branched, glabrous.Leaves elliptic, ovate-oblong, fresh green, 6x2.3 cm. Inflorescence drooping, panicled, 5-31 cm long. Flowers yellow, 3-4 mm across. Pedicel 1-2 mm long. Calyx c. 1 mm long, lobes rounded. Corolla campanulate, lobes c. 3 mm long, reflexed. Style absent; ovary 1-celled, glabrous.Drupe globose, red or white , 2.-5 mm across.

Specimen studied: Nagarparkar, 16-3-2003, very common plant of the region, *Zamarrud & Sarwar* 215 (KUH).

Species grows in Srilanka, India, Pakistan, , W.Asia, Egypt, Ethiopia.

Ecological note: In high saline areas *S.persica* occurs with *Cressa cretica* while on less saline rocks and the plains grows with *Rivea hypocrateriformis, Capparis decidua* and *Dipcade erythraeum* .

Flowering period: February-October.

2.3.38. SCROPHULARIACEAE

Usually herbs or sometimes shrubs or vines and a few are parasites. Leaves simple, alternate or opposite, entire or pinnately lobed. Flowers in racemes or cymes; zygomorphic. Sepals 5, connate. Corolla; usually bilipped, petals 5, connate. Stamens usually 4, didynamous, sometimes 5 or 2, free, epipetlous. Carpels 2, syncarpous; ovary superior, 2-celled, each with many ovules. Fruit usually a septicidal capsule.

A family of worldwide distribution consists of c. 270 genera and 5100 species.

ANTICHARIS

Endl., Nov. Strip. Dec. 22. Gen. 682. 1839; Jafri, Fl. Kar. 302. 1966.

Annual to perennial herbs with viscid hairs. Leaves simple, alternate. Flowers usually solitary, axillary. Calyx and corolla 5-lobed each. Stamens 2. Capsule loculicidally or septicidally dehiscent. Seeds numerous.

A small genus with c. 15 species distributed in tropical and southern Africa, Arabia to Pakistan, India to E. Asia. Represented in Nagarparker by the following species.

Anticharis linearis (Benth.) Hochst. ex.Aschers. in Montsls. Akad. Wiss. Berl. 882. 1866; Jafri, l. c. 302. f. 298.

Annual, branched to 30 cm tall herbs, becoming black on drying. Leaves linear, acute, 2.5-4.5 x 0.2-0.3 cm. Flowers axillary, pedicels 1-2 cm long. Calyx 5 mm long. Corolla purplish, veined, lobes small, oblong, obtuse, slightly longer than calyx. Capsule c. 7 mm long, ovoid. Seeds oblong, longitudinally ribbed.

Distributed in Tropical Africa and from Arabia to Pakistan.

Specimen studied: Nagarparkar, sandy plains, 23-9-2003, *Zamarrud* 427(KUH)

Ecological note: Commonly grows on the plains with *Heliotropium* spp.and at the foot hills with different species such as *Capparis decidua* and *Euphorbia caducifolia.*

Flowering period: September-October.

2.3.39. SOLANACEAE

Herbs, shrubs or sometimes woody vines. Leaves usually alternate and simple. Flowers in axillary cymes or solitary.Sepals and petals 5 each, connate. Stamens 5, epipetalous. Carpels 2, syncarpous; ovary superior, oblique, usually 2-celled each cell with many ovules. Fruit a berry or septicidal capsule.

The family consists of c.100 genera and c.3000 species, subcosmopolitan in distribution.

KEY TO THE GENERA

1+	Cultivated plant with large red or yellowish juicy fruit.....*Lycopersicon*
-	Wild plant or rarely cultivated with smaller fruit.....2
2+	Fruiting calyx enlarged and completely enclosing the fruit.....*Withania*
-	Fruiting calyx not enlarged. Fruit not enclosed by the calyx.....3
3+	Anthers connivent, dehiscence poricidal.....*Solanum*
-	Anthers not connivent, dehiscence not poricidal.....4
4+	Fruit a capsule.....*Datura*
-	Fruit a berry.....*Lycium*

DATURA

L., Sp. Pl. 179. 1753; Gen. Pl. 5. 83. 1754;Y. J. Nasir in E. Nasir & Ali, Fl. Pak. 168: 40. 1985; Zhang Zhi-yun, Lu An- ming & William G. D'Arcy, Fl. China. 17: 330. 1994 .

Herbs with entire-sinuate leaves. Calyx tubular, persistent.Corolla 5-12 lobed, infundibuliform. Ovary 2-celled at the apex, 4-celled at the base. Style slender with bifid stigma. Fruit a tuberculate capsule.

A genus of c.10 species, distributed in Pakistan, India, Australia and Mexico.

Datura metel L., Sp. Pl. 1: 179. 1753; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 137. 1966. Zhang Zhi-yun, Lu An- ming & William G. D'Arcy, l.c. 330.

Datura fastuosa L., Syst., Nat. ed. 10., 2: 932. 1759; Y.J Nasir,l.c. 44. f. 9. E-H. 1985.

Small shrub, 30-100 cm tall. Leaves 5-20 x 4-12(-16) cm; blade ovate, 5-20 x 4-12(-16) cm, sinuate to obtusely dentate ; petiole 9 cm long.Calyx 5-9 mm long. Corolla 10-20 cm long, white, purple or yellowish inside. Anthers 12-15 mm long. Fruit globose, prickly, many seeded.Seeds brown, compressed, reticulate.

Specimen studied:Nagarparkar, Ranger's Check Post, 16-9-2003, *Zamarrud* 329 (KUH).

Widely distributed in Tropical and subtropical regions of Asia, Africa, Mediterranean regions and America

Ecological note: Grows in less saline and disturbed areas.

Flowering period: February-October.

LYCIUM

L., Sp. Pl. 191. 1753; Gen. Pl. 5. 88.1754;Y. J. Nasir, l. c. 31; Zhang Zhi-yun, Lu An- ming & William G. D'Arcy, l.c. 301.

Shrubs with spiny shoots and entire or verticillate leaves. Flowers white or purple. Sepals and petals 4-5 each. Ovary 2-celled. Style slender with capitate stigma. Fruit a berry, globose, red or black.

A genus comprises c.100 species, commonly found in warm, temperate regions of both the Worlds.

Lycium edgeworthii Dunal in DC., Prodr. 13, 1: 525. 1852; Y.J Nasir, l. c. 35. f. 7. A-B.

L. europeum auctt. non L. ; Chaudhri & Chuttar, l. c. 137.

A thorny, 1.5-2 m tall, much branched shrub. Leaves obovate, elliptic-oblong, 5-20 x 2-7 mm. Flowers in axillary clustered, solitary, white, pedicellate.Calyx lobes 1-1.5 mm long,

acute minutely pubescent inside. Corolla lobes 3 mm long.Fruits berry ±3.5 mm broad, globose. Seeds c. 2.5 mm, long, reniform, brown.

Specimen studied: Karanjhar hills near Kalidas dam, 22-9-2003, *Zamarrud* 432 (KUH); Kalidas dam, shrub upto 48 cm tall with yellowish white flowers, 22-3-2005, *Zamarrud* 650 (KUH); Karanjhar hills near Kalidas dam, 22-9-2005, *Zamarrud* 833(KUH).

Distributed from S. Iran to Pakistan.

Ecological note: In rocky areas near water channels, occurs in association with *Tephrosia uniflora.*

Flowering period: March-September.

LYCOPERSICON

Miller, Gard. Dict. Abr.Cd. 4: 1754; Y.J. Nasir, l. c. 21.

Herbs with pinnately compound leaves.Flowers clustered in axillary cyme; yellow 5-merous. Anthers elongated, connate, apiculate, filaments shorter than anthers. Fruit a berry.

A genus of c.8 species, chiefly occur in S. W. America and Galapagos. In Pakistan one species is cultivate.

Lycopersicon esculentum Miller, Gard. Dict. ed. 8, no. 2. 1768; Y.J. Nasir, l. c. 21.

Solanum lycopersicum L.,Sp. Pl. 185.1753.

Mostly cultivated, annual, herb, upto 90 cm tall, branched apically. Leaves imparipinnate, basally lyrate, 15-40 cm long, hairy, lobes elliptic, ovate-lanceolate. Calyx lobes 5-6 mm long, triangular-acuminate, accrescent in fruiting. Corolla yellow, rotate, limbs 15-20 mm broad, lobes minutely ciliate. Ovary pyriform.Fruits berry, depressed-globose, brick red to reddish-yellow.

Specimen studied: Karanjhar hills, 24-3-05, *Zamarrud* 670(KUH)

A native species to C. and S America, now cultivated throughout the world for its edible fruit.

Ecological note: Grows on the hills slopes and the plains as an escape.

Flowering period: March - September

SOLANUM

L., Sp. Pl. 184. 1753; Gen. Pl.5. 71.1754 Y.J. Nasir, l.c. 3; Zhang Zhi-yun, Lu An- ming &William G. D'Arcy, l.c. 314.

Herbs to trees with usually prickly and simple or divided leaves. Flowers solitary.Anthers dehiscence by apical pores. Fruit a berry.

A large genus with c.1400 species, distributed throughout the tropical and temperate regions of both the Worlds.

KEY TO THE SPECIES

1+	Plants unarmed.....*S.nigrum*
-	Plants armed.....2
2+	Plants cultivated for edible fruit.....*S. melongena*
-	Plants wild.....3
3+	Prostrate herb with dark green leaves above.....*S. surattense*
-	Erect herb to shrub with usually grayish-green leaves above.....4
4+	Leaves more than 5 cm long, upper flowers unisexual. Berries 1.5-3 cm across. .....*S. incanum*
-	Leaves 2-4 cm long. All flowers bisexual. Berries 0.6-1 cm across.....5
5+	Leaves ovate-oblong, 2-5 cm long; petiole 0.6-2 cm long, prickly.Pedicel 0.6-0.8 cm long.....*S. forsskalii*
-	Leaves orbicular-ovate, 3.5-25 cm long, petiole 2-3 cm long, not prickly. Pedicel 1-4 cm long.....*S.cordatum*

Solanum cordatum Forssk., Fl. Aegypt-Arab. 47. 1775; Y.J.Nasir, l. c. 12. f. 2. E-F. 1985.

S. gracilipis Decne, Voy.Ind. Jacquemont, 4(3): 113, t. 119. 1844; Chaudhri & Chuttar, l. c. 139.

Perennial, herb, scrambling, upto 60 cm tall; stem hairy.Leaves 10-25 x 7-20 mm, orbicular-oblong. Flowers pale bluish or whitish, lateral or terminal, axillary; pedicel 10-30 cm long. Calyx lobes 2-5 mm long, acute. Corolla, 5-7 mm, stellate hairy outside. Ovary globose. Fruit berry, yellow to red. Seeds subreniform, 2-3 mm.

Specimen studied: Karanjhar hills, 20-9-2005, *Zamarrud* 810(KUH).

Distributed in N. Africa. Arabia, Pakistan and India.

Ecological note: Found on sand mounds and rocky hills with *Capparis decidua* and on the plains often with *Salvadora oleoides.*

Flowering period: September-October

Solanum forskalii Dunal in Hist. Solan, 237. 1813; Y. J. Nasir, l. c. 13. f. 2. I.

S. albicaule Kotshy ex Dunal in DC., Prodr. 1: 204. 1852; Chaudhri & Chuttar, l. c. 138.

Shrublet; 40- 60 cm tall with curved prickles stem and leaves. Leaves short, ovate, entire-repand, ± cordate, 20-50x 10-15 mm; petiole upto 2 cm, prickly. Flowers 2-6 in cluster. Sepals broadly linear, c. 3 mm long,stellate hairy. Petals bluish-purple, hairy outside, c.1 cm long. Stigmas capitate. Fruits berry, yellow, drooping. Seeds subreniform.

Specimen studied: Nagarparkar, sandy plains, 24-9-2005, *Zamarrud* 905 (KUH).

Species found in Tropical Africa, Arabia, Pakistan and India

Ecological note: Grows in residual deposited plains in small communities, also on the sandy plains.

Flowering period: April-September

Solanum incanum L. Sp. Pl. 188. 1753; Y. J. Nasir, l. c. 16. f. 3. C-E.

Shrub, upto 1.2 m tall, covered with dense, stellate hairs. Leaves broadly ovate, 2.5-8 x 2-6.5 cm with prickly veines. Flowers purple-blue, pedicellate; bisexual flowers on upto 20 mm long peduncle, male flowers on short peduncle. Calyx 6-7 mm long, hairy outside. Corolla lobes triangular, 8-11 mm long, dense hairy inside, limb 2-3.5 mm broad. Anthers 5-6 mm long. Fruit berry, globose-subglobose, 15-30 mm broad, yellow. Seeds pale brown, subreniform.

Specimen studied: Nagarparkar, sandy plains, 24-9-2005, *Zamarrud* 906(KUH)

Distributed in India, Pakistan and N.Africa.

Ecological note: Grows as an escape species

Flowering period: September-November

Solanum melongena L., Sp. Pl. 186. 1753; Y. J. Nasir, l. c. 17; Zhang Zhi-yun, Lu An- ming, l.c. 325.

S.insanum L., Mantissa 173. 1767.

A sparsely prickly plant with fruits of various shapes,colours and size, is widely cultivated for its fruit which are used as vegetable and commonly known as Brinjal or egg plant/ Aubergine.

Specimen studied:Nagarparkar, Karanjhar hills, 24-3-2005, *Zamarrud* 669(KUH)

A native of India, cultivated through out the world for its edible fruit.

Ecological note: Sometimes grows as an escape.

Flowering period: March-September

Solanum nigrum L., Sp. Pl. 186. 1753; Y. J. Nasir, l. c. 6.

S.nigrum L., var *villosum* L., Sp. Pl. 186. 1753; Y. J.Nasir, l. c. 6.

Annual upto 60 cm tall herb; Leaves simple, leaf blade decurrent, 2.5-10 x 2-5.5 cm, margin irregular dentate. Flowers white, pedicellate. Calyx and corolla campanulate. Anthers yellow.Fruit a berry, globose to subovoid, black, orange or red.

Specimen studied: Kasbo near Nagarparkar, 18-9-2004, *Zamarrud* 592(KUH).

Distributed widely, except arctic and subarctic regions.

Ecological note: Grows on the plains near water channels in association with *Amaranthus viridis*, *Amaranthus spinosus* and other annuals, especially in the cultivated fields.

Flowering period: Almost round the year.

Solanum surattense Burm. f., Fl. Ind. 57. 1768; Chaudhri & Chuttar, l. c. 139; Y.J.Nasir, l. c. 10. f. 2. A-D.

Perennial, herb, diffusely branched, prostrate. Leaves 20-80 x 25-50 mm, lobes oblong, sinuate, acute.Inflorescence a cyme, 2-4 flowered with 9-20 mm long peduncel. Flowers purple. Calyx lobes 4.5-5 mm long, acute, prickly. Corolla limb, ovate-triangular 2-2.8x10-12 mm. Ovary globose. Fruits 1.5-2 cm across, globose. Seeds discoid or slightly reticulate.

Specimen studied: Nagarparkar, sandy plains, 22-3-2005, *Zamarrud & Alam* 663(KUH).

It occurs in N. Africa, Australia, Polynesia and S & S. E. Asia.

Ecological note: Species grows occasionally on sandy plains and rocky areas while near water channels, occurs abundantly.

Flowering period: round the year.

WITHANIA

Pauquy, Diss. Billadonae. 14. 1825; nom. Cons.; Y. J. Nasir, l. c. 28.

Shrubs with alternate, entire leaves. Flowers in axillary clusters,bisexual or unisexual,with short-pedicel. Ovary 2-celled. Fruit a berry enclosed by a enlarged calyx. A small genus with c.10 species, found mainly in Old World.

KEY TO THE SPECIES

1+	Leaves ± leathery, grayish-withish with 2-10 mm petiole. Plant polygamodioecious.....*W. coagulans*
-	Leaves not leathery, green with 9-20 mm petiole.Plant with bisexual flowers.....*W. somnifera*

Withania coagulans (Stocks) Dunal in DC., Prodr. 13, I; 685. 1852; Y.J.Nasir, l. c. 28. f. 5. E-J.

Perennial, herb or shrub. Leaves alternate, elliptic-ovate or lanceolate, acute, obtuse; petiole 2-10 mm long. Flowers both bisexual and unisexual, bracteate. Bisexual flower: Calyx campanulate, stellate-tomentose outside, lobes 1.5-2.5 mm. Corolla longer than calyx, yellowish inside. Stamens inserted. Stigmas subexerted. Male flowers: stamens ± subexserted; anthers longer than filaments. Female flowers: stamens inserted, anthers short, upto 3.5 mm long. Fruit berry, globose, 10-12 mm, red. Seeds c. 2.5 mm broad, reniform, brown

Specimen studied: Nagarparkar near Rangers check post, 17-9-2003, *Zamarrud* 361(KUH).

Distribution Iran, Afghanistan, Pakistan and India.

Ecological note: Found in less sandy and stony areas with *Datura metel,* rarely with *Withania somnifera.*

Flowering period: January-September.

Withania somnifera (L.) Dunal in DC. Prodr. 13, 1: 453. 1852; Y.J.Nasir, l. c. 30. f. 6. A-E.

Physalis somnifera L., SP. Pl. 182. 1753.

Small shrub, upto 90 cm tall. Leaves elliptic-ovate, acute, 4-13x2-9 cm; petiole 9-20 mm long. Flowers 2-5 in axillary clusters, sessile-subsessile, pale yellow. Calyx 2-2.5 x 2.5-3

mm, accrescent in fruit, stellate hairy. Corolla infundibular, lobe 2-2.5 mm long. Anthers subinserted. Fruits berry, globose, 6-8 mm broad, red. Seeds yellowish brown, minutely reticulate, reniform.

Specimen studied: Nagarparkar, near Rangers Headquarter, 27-3-2005, *Zamarrud & Alam* 747(KUH).

Plant found in Canary Island, Mediterranean, Africa, S.W. Asia, Pakistan & India.

Ecological notes: Not common, usually grows in good moist soil in plains with *Datura metel* and rarely with *Withania coagulans*.

Flowering period: April-July

2.3.40. TAMARICACEAE

Shrubs or trees with minute, scaly, alternate leaves. Flowers in dense spike-like raceme; uni or bisexual. Sepals and petals 4-5 each. Stamens equal to or twice the number of petals, free. Carpels 3-4, syncarpous; ovary superior, 1-celled, 2-many ovuled. Fruit usually a capsule with comose seeds.

The family comprises 4 genera and c.78 species, distributed in Europe, Asia and Africa, especially common from the Mediterranean to Central Asia.

TAMARIX

L., Sp. Pl. 270. 1753; Gen. Pl. 5: 131. 1754; Qaiser in Pak. J. Bot. 13(2).107.1981; in E. Nasir& Ali, Fl. Pak.141: 2. 1982; J.E.Gaskin in C. Bayer and K. Kubitzki, Fam. & Gen. Vasc. Pl. 5: 312. 2003.

Densely branched, shrub or trees with small scale-like, alternate, sessile, amplixicaul leaves. Flowers in simple compound raceme or panicles; usually bisexual, rarely unisexual. Stamens 4-10, rarely 12, usually inserted on or below the disc, diplostemonous or haplostemonous, antisepalous. Ovary pyramidal. Fruit a capsule.

A genus of about 90 species, found in Asia, Europe and N. E. Africa.

KEY TO THE SPECIES

1+	Leaves completely covering the stem (vaginate).Stamens 6-9(-10)..... .... *T. sarensis*
-	Leaves incompletely covering the stem (pseudovaginate), or amplexicaul. Stamens 5.....2
2+	Raceme 3-4(-5)mm broad. Stamens inserted between the lobs of the disc..... *T. indica*
-	Raceme 5-6(-7)mm broad. Stamens fused with the lobs of the disc..... *T. pakistanica*

Tamarix indica Willd., Ges.Naturf. Freunde Berlin. Neue. Schr. 4: 214. 1803; Qaiser in Pak. J.Bot. l.c. 113;in E. Nasir & Ali,l.c. 5. f. l. A-F.

Small tree, upto 8 m tall. Leaves pseudovaginate, ovate, acute 1-2 mm long. Inflorscence simple or compound raceme; bracts triangular, dentate. Sepals 5, trullate-ovate or orbicular. Petals 5, elliptic-obovate, obtuse, 1-2 x 0.75-1 mm. Stamens 5. Ovary ± bottle shaped; styles 3, clavate. Fruit capsule triangular, 6 mm long.

Specimen studied: Nagarparkar, 16-3-2003, *Zamarrud & Sarwar*, 203(KUH);

Mirpur khas Dist.: Cotton cultivated field on way to Nagarparkar, 18-3-2003, *Zamarrud & Sarwar* 236(KUH).

Species found in BanglaDesh, India, Pakistan, Iran, Afghanistan, and Russia.

Ecological note: Found near cultivated fields with *Saccharum bengalense*

Flowering period: January-October

Tamarix pakistanica Qaiser in Pak. J. Bot. l.c: 119; in E. Nasir & Ali, l. c. 13. f. 4. A-J.

Tamarix salina sensu Baum, Monog. *Tamarix* 147.1966. p. p.non. Dyer 1874.

Shrub, upto 3 m tall; glabrous to subglabrous. Leaves sessile, 1-2 x 0.5 mm, amplexicaul, acute or acuminate. Raceme, 5-6(-7) mm broad; bracts triangulate-ovate, 1-1.5 x 0.5-0.7 mm, crenate-dentate or entire; pedicel 0.5-1.25 mm long. Sepals 1.5 x 0.75 mm, ovate, obtuse. Petals elliptic, oblong or obovate, 2-3.5 x 1-1.25, deciduous. Stamens 5, 3-3.5 mm long. Ovary stipitate, conical.

Specimen studied: Nagarparkar plains, 16-3-2003, *Zamarrud* 201 (KUH).

Probably endemic to Pakistan and India.

Ecological note: Common in saline areas with *Salvadora persica*.

Flowering period: January-October

Tamarix sarenensis Qaiser in Pak. J. Bot. l.c. 155; in Nasir& Ali, l. c. 42. f. 17. A-G.

Glabrous shrub, upto 1.5 m tall.Leaves vaginate, 2 mm long, mucronate-spine apex. Inflorescence simple or compound raceme with very short pedicel; bracts amplexicaul, acute-acuminate, ovate, 1-2x1 mm. Sepals 5, equal to bracts, ovate, entire. Petals 5, elliptic 2-3x1 mm.Stamens 6-9 rarely 10, short, c. 2 mm long, opposite. Ovary stipitate.Fruits pyramidal.

Specimen studied: Nagarparkar plains, September 2005, *Zamarrud* 818 (KUH).

Endemic to Sindh (Pakistan).

Ecological note: Grows in Nagarparkar plains near water bed with sedges and grasses.

Flowering period: January-October

2.3.41. TILIACEAE

Herbs, shrubs or trees. Leaves alternate,stipulate. Flowers in cyme. Sepals 5 or 4. Petals 5 or 4 or rarely absent. Stamens 10-many. Carpels 2-3 or sometimes more, syncarpous; ovary superior, 2-10 celled, each cell with 1-many ovules. Fruit usually a capsule or rarely drupe.

The family consists c. 50 genera and 700 species and sub cosmopolitan in distribution.

KEY TO THE GENERA

1+	Stamens present on androphore.....2
-	Androphore absent.....*Corchorus*
2+	Fruit capsular covered with uncinate spines.....*Triumfetta*
-	Fruit a drupe, smooth.....*Grewia*

CORCHORUS

L., Sp. Pl. 529. 1753; Gen. Pl. 5. 234.1754; Ghafoor in Nasir & Ali, Fl. Pak. 75: 20.1974.

Herb-shrub, simple, stellate hairy. Leaves alternate, petiolate and stipulate. Flowers clustered in pedunculate cymes, leaf-opposed or axillary; bracteate, pedicellate or subsessile. Sepals and petals (4-) 5. Stamens 8-20 or many. Ovary 2-5 celled.

A genus of c. 100 species, distributed in tropics and subtropics.

KEY TO THE SPECIES

1+	A mat forming, woody perennial.....*C. depresus*
-	Erect or suberect, annual herb.....2
2+	Capsule with 3 wings.....*C. aestuans*
-	Capsule wingless.....3
3+	Stigma papillate.....*C. tridens*
-	Stigma glabrous.....*C. trilocularis*

Corchorus aestuans L., Mant. Pl. Alt. 555. 1771 Syst. Nat. ed. 10. 1: 1079. 1758; orth. var; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 142. 1966; Ghafoor, l. c. 23. f. 5. A - E; Tang Y., Michael G., Gilbert & Laurance, J. Fl. China, Icon, 4-7. 12 : 222. 2008.

Annual, upto 70 cm tall hairy herb.Leaves 2-9.5 x 1-5 cm,. lanceolate to ovate, oblique with serrate margin; petiole 0.5-4 cm long; stipules 5-7 mm. Inflorescence 2 or rarely 3 flowered cyme. Flowers yellowish; pedicel jointed. Sepals linear-oblong c. 4 mm long, glabrous. Petals obovate, 3.5-5.5 x 3 mm, hairy. Stamens 12-30. Ovary 3-celled. Capsule solitary or paired with 3 stout wings.Seeds rough, blackish-brown.

Specimen studied: Bodhasar, 15-9-2004, *Zamarrud* 566 (KUH); Near Rangers check post, 26-3-2005, *Zamarrud* 733 (KUH); Karanjhar hills, 20-9-2005 *Zamarrud* 807 (KUH); Kasbo, 20- 9-2005, *Zamarrud* 809 (KUH).

Widely distributed in S and S.E. Asia, tropical Africa, Australia, West Indies and C. America.

Ecological note: Commonly grows in the plains and on the hills with *C.tridens, C.trilocularis, Trianthema triquetra,* also grows on sandy plains under the shade of *Acacia nilotica* and *Prosopis cineraria.*

Flowering Period: February-October.

Corchorus depressus (L.) Stocks in Proc. Fl. Egypt, 232. 1956; Chaudhri & Chuttar, l. c. 143; Ghafoor, l. c. 22.

Antichorus depressus L., Mant. 1: 64. 1767.

Prostrate, perennial, herb; glabrescent. Leaves simple, tri-nerved, broadly elliptic, 2.5-20 x 2-10 mm; petiole filiform, 1.5-2.5 cm; stipules linear-fulcate, 2 mm long. Inflorescence usually 2 flowered cyme, antiphyllous. Flowers yellow, sessile-subsessile; bracts linear-

lanceolate, 1-1.5 mm. Sepals yellow-green, 2-4 mm, acute. Petals equal to sepal. Stamens 8-10. Ovary oblong-cylindric.Capsule oblong, cylindric, 5-22 mm long, Seeds blackish, grey, triangular, obliquely truncate.

Specimen studied: Nagarparkar, sandy area near Rangers Head quarter, 24-9- 2005, *Zamarrud* 900 (KUH).

A cosmopolitan weed.

Ecological note: Plant grows frequently throughout the desert.

Flowering period: February-November.

Corchorus trilocularis L., Mant. 77. 1767; Ghafoor, l.c. 27. f.6. E - F.

Annual or perennial, undershrub, upto 1.5 m tall. Leaves oblong-lanceolate or ovate-oblong, 1-12 x 0.5-3.2 cm, hairy on both sides, crenate-serrate; stipules setose, 5-8 mm long. Inflorscence 1-3 flowered cyme with short peduncle, antiphyllous. Flowers yellow; pdicel c. 2.5 mm long; bracts linear-lanceolate c. 3 mm long. Sepals 5 mm long, linear-oblong. Petals pandurate. Stamens 15-20.Capsule triangular, hairy.

Specimen studied: Nagarparkar, 24-3-2005, *Zamarrud & Alam* 689(KUH); Kasbo, 24-9-2005, *Zamarrud* 904 (KUH); Bodhasar, 24-9- 2005, *Zamarrud* 901(KUH).

Species grows widely in Pakistan

Ecological note: Plant grows on both rocky and sandy areas and also in cultivated fields.

Flowering Period: February-October

GREWIA

L., Sp. Pl. 964. 1753; Gen. Pl.5. 225.1754; Ghafoor, l.c. 2.

Shrubs or trees, rarely twiner with stellate hairs and alternate, stipulate leaves. Flowers clustered in pedunculate, umbellate, cymes, axillary or solitary, antiphyllous. Sepals and petals 5 each, free. Stamens numerous, Carpels 2-4, syncarpous.Fruit drupe.

A genus of c. 150 species, distributed in tropical and subtropical regions of Asia, Africa and Australia.

KEY TO THE SPECIES

1+	Leaves not leathry.Flowers white.....*G. tenax*
-	Leaves leathry.Flowers yellow.....*G. villosa*

Grewia tenax (Forssk.) Fiori in Agric. Colon 5. Suppl. 23. 1912; Chaudhri & Chuttar, l. c. 144; Ghafoor, l. c. 7. f. 2-10.

Chadara tenax Forssk., Fl. Aegypt-Arab. 105. 1775.

Shrub, 2-3 m tall. Leaves simple, almost orbicular, 3-5 costate, 0.5-4.5 x 0.5-4 cm, glabrous-densely; petiole 1-14 mm long; stipules linear-lanceolate, caducous.Sepals linear-oblong, hairy outside. Petals 0.5-14x2 mm, limbs longer than claw. Ovary 4-lobed. Fruit 2-4 lobed, glabrous or stellate hairy, orange, yellow with reddish tinge.

Specimen studied: Karanjhar hills, 19-9-2004, *Zamarrud* 595 (KUH).

Species widely distributed in Pakistan and India.

Ecological note: Occassional on the hills but dominant on sandy plains in association with *Acacia* senegal, *Ziziphus nummularia* and *Prosopis cineraria* and often with *Tecomella undulata.*

Flowering period: September-October.

Grewia villosa Willd. in Nov. Act. Nat. Cur. Berol. 205. 1805; Chaudhri & Chuttar, l. c. 144; Ghafoor, l. c. 11. f. 3. A-E.

Much branched, upto 3 m tall, shrub. Leaves ovate-orbicular,1.4-7 x 1-7.5 cm; petiole filiform, 1-2.5 cm long; stipules foliaceous, ovate-oblong, c. 1 cm long, hairy. Flowers yellow white tinged; pedicel 5-8 mm long; bracts elliptic-lanceolate, upto 8 mm, stellate hairy. Sepals oblanceolate, 8-10 x 2.5 mm, densely hairy, acute. Petals obovate, claw minute, limb 5 x 2 mm long. Stamens 25-30. Fruit compressed, unlobed, subglobose.

Specimen studied: Karanjhar hills, 19-9-2004, *Zamarrud* 594 (KUH).

It is found in Pakistan, India, Tropical Africa, Arabia, Egypt, Cape Verde, Islands and East India

Ecological note: A dominant plant of the hills, grows in association with *Euphorbia caducifolia* and *Acacia senegal.*

Flowering period: March-September.

TRIUMFETTA

L., Sp. Pl. 444. 1753; Gen.Pl. 5. 285. 1754; Ghafoor, l. c. 15.

Herb-shrub with alternate usually palmately lobed, stipulate leaves.Flowers leaf-opposed or axillary; pedicellate. Sepals and petals 5 each. Stamens 5-many, free or hooded, armed.

Carpels 2-5, syncarpous; ovary ovoid-ellipsoid with 2-5 celled, each with 2-ovuled. Fruits indehiscent or loculicidal capsule.

A genus of c. 150 species, mainly distributed in the tropics and subtropics of both the hemisphere.

KEY TO THE SPECIES

1+	Annual or perennial, herb.Petals obtuse.Stamens 5 rarely 10.....*T. pentandra*
-	Shrub or undershrub.Petals emarginate.Stamens 10-25.....*T. rotundifolia*

Triumfetta rotundifolia Lam., Encycl. Method. Bot. 3: 421. 1789; Chaudhri & Chuttar, l. c.145; Ghafoor, l. c. 16. f. 4. A-B.

Shrub or undershrub with spreading branches, upto 60 cm tall. Leaves broadly obovate-orbicular, 0.7-4.2 x 0.8-4.2 cm, densely hairy; petiole 0.6-0.5 mm long; stipules 3-4 mm long, subulate, hairy. Flowers in cymes arranged racemosely, extra-axillary; yellow; bracts 3 mm long, linear. Sepals 5 mm long, ligulate, cucullate, awned at the apex, stellate hairy outside. Petals slightly shorter than sepals, emarginate at the apex, spatulate. Stamens 10-25. Fruit ovoid with uncinnate spines.

Specimen studied:Karanjhar hills, 21-1-70, *Qaiser& Ghafoor* 3959 (KUH); Karanjhar hills, 19-9-2004, *Zamarrud* 593(KUH).

Species occurs in Pakistan and India

Ecological note: Commonly found in the valleys of the hills with different species such as *Euphorbia caducifolia* and many herbs.

Flowering period: August-September.

Triumfetta pentandra A. Rich. in Guill. & Perr., Fl. Senegamb. Tent. 1: 93. t. 19. 1831; Ghafoor, l. c. 19. f. 4. C-D.

Annual, upto 60 cm tall herb. Leaves 4.5-9 x 3.5-6 cm, simple hairy above and stellate below, lower leaf rhomboid-ovate, palmately 3 lobed, upper leaf ovate-lanceolate, unlobed, accuminate; petiole 1-5 cm long; stipule 5-6 mm long, subulate. Flowers in cyme, arranged racemosely, opposite to leaf; bracts 2-3 mm long, hairy, linear. Sepals ligulate, subulate, stellate hairy outside, awned at the apex. Petals obtuse, as long as sepals. Stamens 5, rarely upto 10. Carples 2; ovary 2-celled. Capsule with hooked spines, densely hairy, ovoid.

Specimen studied: Karanjhar hills , *Qaiser, Ghafoor &Abrar Hussain* 4004 (KUH); Karanjhar hills,19-9-2004, *Zamarrud* 598(KUH).

Distribution South Asia, Cap Verde Islands, Tropical Africa and Formosa.

Ecological note: Common on the hills in association with *Capparis decidua, Cadaba farinosa.*

Flowering period:September-October.

2.3.42. VERBENACEAE

Herbs to shrubs. Leaves simple, opposite. Inflorescence of various type. Flowers zygomorphic. Sepals and petals 5 each, connate. Stamens: 1 sterile and usually 4 fertile, didynamous. Carpels 2, syncarpous; ovary superior, 2-4 celled, each cell 1-ovuled. Fruit generally a drupe.

A family of c.75 genera and c. 2500 species, mostly found in tropical and subtropical regions of the World.

CLERODENDRUM

L., Sp. Pl. 637. 1753; Gen. Pl.5. 285.1754; Jafri, Fl. Kar. 288. 1966; Jafri & Ghafoor in E.Nasir & Ali, Fl. Pak. 77: 29. 1974.

Usually shrub or trees occasionally with opposite, petiolate, entire-dentate leaves. Flowers in axillary or terminal cyme or rarely solitary; bracteate. Stamens 4, epipetalous. Fruit a fleshy drupe

A genus of c. 200 species, distributed in tropics and warm regions, mainly in the old world.

Clerodendrum phlomoides L.f. Suppl. 292. 1781; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 145. 1966; Jafri & Ghafoor, l. c.: 31. f. 7. A-B.

Shrub, upto 4m tall; Leaves opposite, ovate 1-5 x 1-3.5 cm; petiole 0.8-2.5 cm long. Flowers in axillary, cymes; creamy-white or yellowish, c .1.5 cm across; pedicel 1.5-10 mm long, densely hirsute; bracts ovate, lanceolate.Calyx lobes 5, 4-5 mm long, campanulate, glabrous, pale or yellowish green. Corolla tube 2-2.5 cm long, narrow, pubescent inside, lobes 5 subequal, ovate-elliptic, 7-8 mm long. Ovary 4-celled. Drupe ovoid, black. Seeds oblong, white.

Specimen studied: Kasbo, 18-9-03, *Zamarrud* 366 (KUH); Nagarparkar- sandy plains, 18-9-03, *Zamarrud* 367(KUH).

Distributed in India and Pakistan.

Ecological note: Species grows occasionally on sandy plains with *Capparis decidua Prosopis cinerarea* , *Acacia nilotica* and other *Cucerbiteceous* herbs.

Flowering period: February - September

2.3.43. ZYGOPHYLLACEAE

Herbs or shrubs. Leaves opposite or sometimes alternate, 2-3 foliate. Flowers in cyme or solitary.Sepals 5, free. Petals 5 or 4, free. Stamens 5-15, 1-3 seriate, free. Carpels 4-5 syncarpous; ovary superior, 4-5 celled, each cell with 2-many ovules. Fruit usually a capsule.

A family of c. 30 genera and c.300 species, distributed in tropical and warm regions.

KEY TO THE GENERA

1+	Stipules spine like.....*Fagonia*
-	Stipules not spine like. 2
2 +	Leaves pinately compound. Stamens unequal.Fruit a schizocarp.....*Tribulus*
-	Leaves simple or 1-3 foliolate. All stamens equal. Fruit a capsule.....*Zygophyllum*

FAGONIA

L., Sp. Pl. 386. 1753; Ghafoor in E.Nasir & Ali, Fl. Pak. 76: 9. 1974; M.C. Sheaham in K.Kubitzki, Fam. & Gen.Vasc. Pl: 9. 493.2007.

Diffusely branched, annual or perennial, herbs. Leaves simple, opposite or 1-7, foliolate; petiolate; stipules modified into spines. Flowers solitary, axillary; pedicellate. Sepals and petals 5 each. Stamens 10. Ovary 5-celled with 2 ovules each. Capsule pyramidal, 5-angled.

About 30 species, found mainly in Mediterranean, S. W. Asia and N. E. tropical Africa-NW India-Pakistan, SW Africa and SW North America (United States).

Fagonia indica Burm. f., Fl. Ind. 102. tab. 34. fig. 1. 1768; Chaudhri & Chuttar, Veg. Rang. Fl. Thar desert, 146. 1966; Ghafoor, l. c. 76. f. 16. 1974.

Perennial, herb, branches procumbent. Leaves unifoliate at the apex, trifoliate at the base; leaflets linear-lanceolate, 6-35 x 0.5-4 mm, sessile or petioled; stipules spine like. Flowers pink-purple; pedicel 4-6 mm long. Sepals ovate, 3-4 x 1.5 mm, glandular, pale green, acute, persistent. Petals spatulate, c. 6 x 3 mm, obtuse. Stamens c. 6 mm long. Capsule 1-seeded.

Specimen studied: Kalidas dam, prostrate, perennial herb with yellow flowers, 15-9-03, *Zamarrud* 312 (KUH).

Species occurs through out India-Pakistan and also in semi arid regions of North and East tropical Africa.

Ecological note: Common throughout Nagarparkar, grows with different species and also form pure population on rocky plains.

Flowering period: March -September

TRIBULUS

L., Sp. Pl. 386. 1753; Gen. Pl. 5. 183. 175; Ghafoor, l. c. 21.

Prostrate-decumbent, annual or perennial, herbs with alternate, opposite, paripinnate, stipulate leaves. Flowers axillary, solitary. Sepals and petals 5 each. Stamens 10 in 2 series.Ovary sessile, 5-celled with 2-10 ovuled. Fruit schizocarpic, winged or spinous.

A genus with c.20 species, mainly found in tropical and subtropical parts of the world.

Tribulus terrestris L. Sp. Pl. 387. 1753; Ghafoor, 76. l. c. 26.

Annual, prostrate, herb, densely appreased. Leaves peripinnate, 2.5-5 cm long; stipules lanceolate to falcate; leaflet lanceolate, elliptic, 5-12x 3-8 mm. Flowers yellow; pedicel upto 1.5 cm long. Sepals ovate, 4-6 x 2.5 mm, acute. Petals obovate, 5-8 x 3-5 mm. Ovary hirsute. Mericarp 4-8 mm long, densely hairy.

Specimen studied: Nagarparkar, 19-9-03, *Zamarrud* 398 (KUH).

Widely grows in Tropical and sub tropical regions of Asia, Africa, S. Europe, North Australia and America.

Ecological note: Found throughout the sandy area commonly in association with *Convolvulus prostratus*, *Boerhaavia repens*, and *Eclipta prostrata* while rare on the hills.

Flowering Period: September-November

ZYGOPHYLLUM

L., Sp. Pl. 385. 1753; Gen. Pl. 5. 182. 1754 Ghafoor, l. c. 27.

Diffusely branched, annual to perennial, prostrate, halophyte with simple or 1-2 foliolate, stipulate leaves. Flowers solitary, axillary, yellow or white. Sepals and petals 4-5 each. Stamens 8-10.Ovary hypogynous, sessile, 4-5 celled with superposed ovules. Fruit loculicidal capsule.

A genus of c.100 species, distributed in desert and steppes from Mediterranean to Central Asia, S. Africa and Australia.

Zygophyllum simplex L., Mant. 1:68. 1767; Chaudhri & Chuttar, l. c. 147; Ghafoor, l. c. 26.

Annual, procumbent to prostrate, 8-20 cm long, branched, glabrous herb.Leaves succulent, simple, sessile, oblong-cylindric, 4-18 mm long, stipules lanceolate, acute. Flowers yellow to pale white, pedicel slender, 1.5-3 mm long. Sepals, elliptic-oblong, 1.5-2 mm long. Fruit deflexed, 2-3 seeded.

Specimen studied: Near Run pur goath, Nagarparkar, 26-10-70, *Qaiser, Ghafoor & Abrar Hussain* 4131 (KUH); Kranjhor hills behind godawn, 26-3-05, *Zamarrud & Alam* 755 (KUH).

Species grows in Pakistan, India, Iran, tropical and north Africa, Cape Verde Islands and west Asia.

Ecological note: Species found in saline areas commonly in association with *Salsola imbricata* and *Suaeda fruticosa*.

Flowering Period: February-October

2.4. KEY TO THE MONOCOT FAMILIES

1+	Plant grows in aquatic or marshy places..... 2
-	Plant terrestrial..... 3
2+	Stamens 1-3, surrounded by hairs monadelphous.Carpel 1. Fruit follicle..... .....Typhaceae
-	Stamens 1-3 free.Carpel 3.Fruit an achene or nutlet..... ....Cyperaceae
3+	Perianth segments absent or rudimentary..... 4
-	Perianth segments present..... 5
4+	Leaf sheath usually open Culms terete, usually hollow.Fruit a caryopsis..... .....Poaceae
-	Leaf sheath usually closed.Culms usually triangular and solid.Fruit an achene or nutlet..... .....Cyperaceae
5+	Flowers enclosed by cordate or boat-shaped spathe..... 6
-	Flowers not enclosed by sheath spathe. 7
6+	Annuals or perennials. Inflorescence usually helicoids cyme. Stamens 6, fertile 3 and sterile 3..... .....Commelinaceae
-	Tree. Inflorescence usually a panicle. Stamens 6 all fertile.... .Arecaceae
7+	Plants with bulb ....Hyacinthaceae
-	Plant without bulb..... Asphodelaceae

2.4.1. ARECACEAE (PALMAE)

Trees with short or tall unbranched stems. Leaves usually large , simple or compound. Inflorescence usually a panicle, covered by a spadix. Flowers usually unisexual, actinomorphic. Perianth segments 6, 2-seriate. Carpels usually 3, syncarpous; ovary superior, 1-3-celled. Fruit a berry or drupe.

A family comprises 200-210 genera and c.2800 species, distributed in tropical and subtropical regions of the world.

PHOENIX

L. Sp. Pl. 1188. 1753; Gen Pl. 5: 496. 1754; Malik in E. Nasir & Ali, Fl. Pak.153: 23.1975.

Dioecious palms with cylindrical stem covered with petiole. Leaves pinnate; pinnae, coriaceous, lanceolate, longitudinally folded; petiolate; sharp spiny at the apex. Flowers arranged in simple branched, axillary, coriaceous prophyll.

A genus with c.17 species found mainly in the Old World. In Pakistan represented by 4 species. There is only 1 species in Nagarparkar.

Phoenix dactylifera L., Sp. Pl. 1188. 1753; Chaudrii & Chuttar, Veg. Rang.Fl. Thar desert, 117. 1966; Malik , l. c. 23.

Palm tree, upto 30 m tall. Leaves pinnate, 1-5 m long;leaflets 15-40 x 2-2.5 cm with long spines; lower leaflets modified into spines.Inflorscence simple, branched, axillary, covered with hard, bracts. Female inflorescence spike, spikelets numerous. Rachilla upto 30 cm long; flowers green. Calyx trilobed, fused at the base, 4 x 2 mm each. Petals orbicular, 12 x 6 mm. Male inflorescence small, 12-25 cm long .Flowers sessile. Petals 6-8 mm long. Pistilodes, scaly. Fruits fleshy, yellowish - brown, edible. Seeds stony, reddish brown, longitudinaly grooved.

Specimen studied: Own-jo-Wandio, 24-9-2005, *Zamarrud & Alam* 845(KUH).

Probably native to W. Asia and N. Africa, widely domesticated in Pakistan for its valuable fruit.

Ecological note: Grows as an escape in saline areas near Rann of Kutch with *Salvadora oleoides*, *Prosopis juliflora* and *Cressa cretica.*

Flowering period: March – April

2.4.2. ASPHODELACEAE

Perennial or annual herbs, sometimes trees, often succulent. Leaves linear-lanceolate usually succulent. Flowers in raceme or panicles. Perianth segments 6, 2-seriate. Stamens 6. Carpels 3, syncarpous; ovary superior, 3-celled, 2-many ovules in each cell. Fruit a dehiscent capsule, rarely berry like.

A family of c.15 genera and c. 700 species, mainly distributed in the tropical, subtropical and temperate regions of the Old World, mainly Southern Africa.

KEY TO THE GENERA

1+	Succulent, perennial herb. Leaf margins prickly.....*Aloe*
-	Non succulent, annual herb. Leaves smooth.....*Asphodelus*

ALOE

L. Sp. Pl. 320. 1753; Gen. Pl.5.391.1754; G.F.Smith & B.-E. Vanwyk in K. Kubitzki, Fam. & Gen.Vasc. Pl. 3 : 138. 1998; Ali in Ali & Qaiser, Fl. Pak. 211: 2. . 2005

Perennial herb with reduced stem and rosulate, 1, 2 amplexicul, fleshy and spiny marginal leaves. Flowers in raceme. Perianth segments in 2 series of 3 each. Stamens, epiphylous. Fruit a loculicidal capsule.

The largest genus of the family with c. 400 species, mainly distributed in Africa and Arabia but naturalized in China, India, Pakistan and Mediterraen region.

Aloe vera (L.) Burm. f., Fl. Ind. 83. 1 Mar-6 April 1768; Chaudhri & Chuttar,Veg. Rang. Fl. Thar desert. 103. 1966; Ali , l. c. 2. f. 1. A-D. 10

Aloe perfoliata L. var. *vera* L. Sp.Pl. 1: 320. 1753.

Leaves sessile, 15-35x 4-8 cm, linear-lanceolate, ascending, glaucous, spiny dentate. Inflorescence pedunculate, erect, scapigerous, 60-100 cm long, raceme, sometimes divided into 2 branches. Flowers pedicellate, reflexed; bracts ovate-lanceolate. Perianth segments 6, 2-3 cm long, reddish, persistent. Ovary 3-celled. Fruit 1.5 cm long.

Specimen studied: Karanjhar hills, 24-9-2005, *Zamarrud & Alam* 886 (KUH).

Cultivated in many countries, widely naturalized in West Indies, Central America, Purtugal, Turkey, South Asia and China India and Pakistan.

Ecological note: Common on sandy plains near waterbeds.

Flowering Period: January-April

ASPHODELUS

L. Sp. Pl. 309. 1753; Gen. Pl. 5.146. 1754; G.F.Smith & B.-E. Vanwyk, l. c.137.f . 41 A-E; Ali, l. c. 4.

Annual-perennial, herbs with short rhizomes. Leaves basal with a membranous sheath at the base. Flowers in raceme or panicles with articulate pedicles. Perianth segment single veined, free or connate. Fruit a loculicidal capsule.

A small genus of more than 12 species, distributed in Mediterranean-West and S. Asia.

Asphodelus tennifolius Cav., Anal. Cienc. Nat.3: 46. t. 27. 1801; Ali, l. c. 4. f.2. A-G.

Asphodelus fistulosus L. var. *tenuifoilus* (Cav.) Baker in J. Linn. Soc. Bot. 15. 272. 1876.

Annual, 15-50 cm tall, herb. Leaves basal , linear, sheathing at the base, 15-30 cm x 1-3 mm. Scapes many, 30-60 cm long, branched. Flowers in lax racemes; pedicel 4-6 mm

long; bracts broadly ovate, 2.5x2 mm, scarious. Perianth segments white to purplish. Stamens 3+3, free. Fruit loculicidal capsule globose. Seeds 1-2 in each locule, black, trigonous.

Specimen studied: Own-jo-wandio, 10 km in west of, 22-9-2005, *Zamarrud& Alam* 823 (KUH).

S.W. Europe, Africa, S.W. Asia, Pakistan and India.

Ecological note: Common as weed and also on sandy plains with *Arnebia hispidisima, Amaranthus viridis* and *Eclipta prostrata.*

Flowering period: November-April

2.4.3. COMMELINACEAE

Mostly perennial or annual herbs. Leaves simple, alternate, base sheathing. Inflorescence usually helicoids cyme. Flowers sometimes enclosed by cymbiform spathe. Perianth segments 6, 2-seriate. Stamens 6, functionally few. Carpels 3, syncarpous. Ovary superior, usually 3-celled. Fruit usually a capsule.

A family of c.40 genera and 640 species, distributed in tropical and subtemperate regions.

COMMELINA

L. Sp. Pl. 1: 40. 1753 ; Gen. Pl. 525. 1754 ; Qaiser& Jafri in E.Nasir & Ali, Fl. Pak. 84: 9. 1975.

Usually prostrate with sub-fleshy, entire elliptic leaves. Flowers in twos, subtended by hooded spathes; upper cymes with small and often sterile flowers, lower cymes larger with fertile flowers.Stamens 3, fertile, staminodes 2-3. Ovary 2-3 celled. Fruit a loculicidal capsule.

A genus consisting of c. 170 species, distributed in tropical and warm regions. In our area it is represented by 1 species.

Commelina albescens Hassk in Schweinf ., Beitr. Fl. Aethiop. 210. 1867; Qaiser & Jafri, l. c. 10. f. 3. A. 1975.

Perennial herb; stem prostrate to decumbent, 15-65 cm long, branches with thickened nodes. Leaves 1.5-10 x 3-15 mm, lanceolate. Spathe 1-3 cm long, cordate, subsessile, falcate, folded. Flowers 3-5 in a spathe; bracteolate. Sepals 2-5 mm long. Petals blue,

suborbicular, claw 8 mm long with suborbicular limb; pedicels 5-6 mm long. Capsule c. 4 mm, suborbicular. Seeds 2 mm long.

Specimen studied: Kashbo, 19-11-2002, *Zamarrud* 29 (KUH); Nagarparkar, 23-9-2003 *Zamarrud* 439 (KUH).

Grows in Tropical Africa, Arabia and Pakistan.

Ecological note: In protected localities having good drainage, grows frequently in association with *Amaranthus* spp. and *Chloris barbata*

Flowering period: throughout the year.

2.4.4. CYPERACEAE

Usually perennial herbs with creeping rhizome. Stem solid, triangular. Leaves sedge like, sheath tubular, closed. Inflorescence a spike. Flowers bisexual or unisexual. Stamens usually 1-3. Carpels 3, syncarpous; ovary superior. Fruit a trigonous or biconvex nut.

A genus of c. 70 genera and c.2000 species found throughout the world. In our area only one genus and 2 species are found.

CYPERUS

L., Sp. Pl. 1: 44. 1753; Gen. Pl.5 26. 1754;Kukkonen, in Ali & Qaiser, 206: 82. 2001.

Herbs and shrubs with erect stem, usually triangular and rhizomatous base. Flowers arranged in spike or compact head; rachilla persistent; glumes distichous, usually many, the 2 lowest empty, the succeeding bisexual. Stigma 3-fid. Fruit nutlets.

A genus of c. 600 species, mainly distributed in tropical and warm regions of the world.

KEY TO THE SPECIES

1+	Leaves equaling the stem,sheath 20-40 mm long, ligule absent.Inflorescence capitate.....*C. arenarius*
-	Leaves shorter than stem, sheat upto 10 mm long, Ligulate.Infloresence anthilodium.....*C. rotundus*

Cyperus arenarius Retz., Observ. Bot. 4: 9.1786; Kukkonen, l. c.120.

Rhizomatous, perennial herb, upto 30 cm tall. Stem c. 1 mm across, cylindrical. Leaves equaling the stem; sheath long, nerved, disintegrating into fiber at maturity; ligule absent.

Leaf-blades c.1 mm wide, curved, scabrous at the margin. Inflorescence capitate, upto 20 mm across, composed of 5 to more than 20 spikes; bracts 1-2 foliose, upto 50 mm, rarely 100 mm, rigid, sheathless; spike 8-20 mm, ovoid; glumes 14-20, caducous; rachis zigzag. Nut 1.5-1-7 x 1.3 mm, ovoid.

Cyperus rotundus L., Sp. Pl.1: 45.1753; Chaudhri & Chuttar, Veg. Rang.Fl. Thar desert, 75. 1966; Kukkonen, l. c.101

Perennial herb, 20-60 cm tall with creeping, trigonous stem and c. 2x1 cm tuber . Leaves shorter than stem; sheaths long, sometimes reddish, blades 30 x 0.1-0.5 cm, flat or folded, long attenuate at apex. Inflorescence an anthilodium, 4-10 cm long; lower most bracts 2-3, foliose and longer than inflorescence, rachis 4-angled. Flower bisexual.Nuts c. 1.5x1 mm, ellipsoid or abovoid, brownish to black trigonous.

Specimen studied: Karanjhar hills near godown, 24-3-2005, *Zamarrud & Alam* 674(KUH).

Grows in Tropical and subtropical areas throughout the world.

Ecological note: Common throughout the area, especially near cultivation and moist places.

Flowering period: February-March.

2.4.5. HYACINTHACEAE

Annual to perennial, bulbous, herb. Leaves 1-many, filiform. Inflorescence scapose, simple or compound raceme or spike. Perianth segments 6, 2-seriate. Stamens 6, 2-seriate, sometimes in 1-series Carpels 3, syncarpous. Ovary superior, 3-celled. Fruit a loculicidal, dehiscent capsule.

A family of c.70 genera and 900 species distributed in both the Worlds but mainly in Southern Africa-Mediterranean regions.

DIPCADI

Medik, Hist. Comm. Acad. Elect. Sci. Theod. Palat. 6: 431. 1760; F. Speta in K. Kubitzki, Fam. & Gen.Vasc. Pl. 3 : 275. 1998 ; Ali in Ali & Qaiser, 214: 5. 2005.

Perennial, bulbous, herbs with pappry scales. Leaves basal, linear-lanceolate. Flowers in scapose raceme.Perianth segments fused and forming a tube. Stamens attached with

perianth segments; ovary 3-celled, c.20-ovules in each. Capsule subglobose with orbicular black seeds.

A genus with c. 30 species, distributed in the Old World, mainly in Mediterranean region.

Dipcadi erythraeum Webb. & Berth., Hit. Nat. Cemar. 5. 3: 341. 1848; Ali, l. c. 7.

Perennial, herb, 10-20 cm tall with 2-3 x 1.5-2.5 cm, ovoid bulb. Leaves terete, erect, 5-6, 15-20x0.2-0.4 cm.Scape 4-20 flowered. Flowers 1-2-1.4 cm; pedicels 2-3 mm long; bracts 7-9 mm long with prominent nerve. Perianth segments in 2 groups, subequal, fused for about 1/3 length from the base. Fruit 3-valved, 12-14 mm long. Seeds 6-7 mm.

Specimen studied: Kranjhor hill behind godam, 26-3-05, *Zamarrud & Alam* 556 (KUH).

Found in Egypt, Saudi Arabia, Iraq, Iran, Afghanistan, Pakistan and India.

Ecological note: Common on the hills.

Flowering period: February-July

2.4.6. POACEAE (GRAMINEAE)

Usually annual or perennial herbs with cylindrical, hollow culms. Leaves alternate, sheath open at the base. Flowers in spikes, racemes or panicles or panicles of spikelets; usually bisexual. Perianth represented by 2-lodicules. Stamens 3, rarely 1, 2 or 6; carpel 1; ovary superior, 1-celled, stigmas 2, plumose. Fruit a caryopsis.

A large family of c. 670 genera and 9500 species of world wide distribution mainly in tropical and N. temperate areas. Represented by 17 genera in our area.

KEY TO THE GENERA

1+	Annuals or perennials, underground parts stoloniferous or rhizomatous.....2
-	Annuals or perennials, underground parts not stoloniferous.....6
2+	Inflorescence of digitate 1-sided spike. Spikelets 1-flowered. Caryopsis llipsoid.....*Cynodon*
-	Inflorescence various type, digitate but not 1-sided spike. Spikelets 2-many flowered.....3
3+	Inflorescence composed of 2-5 short, secund, digitate raceme, deciduous at maturity.....*Ochthochloa*
-	Inflorescence spike or panicle, persistent.....4
4+	Lower lemmas usually reduced, palea absent. Caryopsis ellipsoid-linear, open.....*Chloris*
-	Lower lemma well developed, palea usually present. Caryopsis not ellipsoid or linear, enclosed within hyline pericarp.....5

5+	Inflorescence composed of several linear-narrowly oblong, secund spike. Glumes subequal. Caryopsis angular .....*Dactyloctenium*
-	Inflorescence composed of short densely clustered spike but not secund or narrow, erect linear panicle. Glumes unequal. Caryopsis obliquely ovoid.....*Desmostachya*
6+	Inflorescence a pair of short peduncled racemes covered by a boat shaped spathe.....*Cymbopogon*
-	Inflorescence various type but not covered by the spathe.....7
7+	Tall, robust perennial with solid culms. Spikelets enveloped by silky hairs Inflorescence flexuous.....*Saccharum*
-	Annuals or perennials . culms not solid, silky hairs absent. Inflorescence not flexuous.....8
8+	Lower floret reduced to a hyline lemma.....*Dichanthium*
-	Lower floret not reduced to hyline lemma.....9
9+	Spikelets subtended by the bristles.....10
-	Spikelets not subtended by the bristles.....12
10+	Bristles persist after falling the spikelets.....*Setaria*
-	Bristles deciduous.....11
11+	Bristles connate at the base. Leaf-blades flat or involute.....*Cenchrus*
-	Bristles free throughout. Leaf-blades flat or convolute.....*Pennisetum*
12+	Densely tufted annuals or perennials.Spikelets awnless.....14
-	Not densely tufted annuals or perennials.Spikelets with awn.....13
13+	Inflorescence panicle, contracted or spike-like. Spikelets 1-flowered.....*Aristida*
-	Inflorescence terminal, solitary or spike. Spikelets 4-many flowered.....*Tetrapogon*
14+	Leaf sheath and inflorescence glandular.....*Eragrastis*
-	Leaf sheath and inflorescence non glandular.....15
15+	Infloresence stiff, dense, cylindrical spike. Spikelets in deciduous clusters.....*Tragus*
-	Inflorescence various type but not in deciduous clusters.....16
16+	Inflorescence much branched panicle.....*Panicum*
-	Inflorescence composed of racemes.....17
17+	Lower glumes adaxil. Caryopsis elliptic.....*Brachiaria*
-	Lower glume abaxil. Caryopsis oblong.....*Digitaria*

ARISTIDA

Sp. Pl. 1: 82. 1753; Gen. Pl. 5:35. 1754; Cope in E.Nasir & Ali, Fl. Pak. 143: 40. 1982.

Densely tufted without rootstcks. Leaves linear, usually in basal tufts in perennials and on the culms in annuals. Inflorescence of contracted or spikelet panicle. Spikelets 1-flowered

with long, scarious glumes and with cylindrical or laterally compressed, indurated lemma ending, palea ± half as long as lemma.

The genus comprises c.330 species, distributed in tropical and subtropical regions. It is represented by 4 species in our area.

KEY TO THE SPECIES

1+	Densely tufted perennial, culms upto 2 m tall.....*A. cyanantha*
-	Annuals rarely short lived perennial, culms 15-70 cm tall.....2
2+	Glumes awnless, lemma without articulation, 5-17 mm long.....*A. adsensionis*
-	Glumes with awn, lemma with articulation, usually 4 mm long.....3
3+	Panicle narrow ovate, 12-20 cm long. Callus linear, 1-1.5 mm long.....*A. mutabilis*
-	Panicle linear upto 10 cm long. Callus conical, 2 mm long.....*A. funiculata*

Aristida adscensionis L., Sp. Pl. 1: 82. 1753; Cope, l. c. 41. f. 6. 1-10. 1982.

Usually annual or short lived perennial; tuft, upto 1m tall, erect or spreading. Leaves 20 x 0.3 cm, linear, sometimes folded. Panicle upto 30 cm, loose, dense and narrow; spikelets pallid, green or purple; glumes unequal, awnless; lemma 5-17 mm long or equal to glume, laterally compressed, convolute, scabrulous at the apex or awned, central branch of the awn 7-25 mm long, callus short, narrowly oblong, obtuse.

specimen studied: Nagarparkar, 26-10-1970, *Qaiser, Ghafoor & Abrar Hussain* 4096 (KUH); Nagarparkar, 19-11-2002, *Zamarrud & Sarwar* 101(KUH);

Throughtout the tropics, and widely occurs in Pakistan.

Ecological note: A widely distributed species throughout the area.

Flowering period: March-December

Aristida cyanantha Nees ex Steud., syn. Pl. Glum. 1: 141. 1854; Cope, l. c., 44

Robust perennial; culms upto 2 m tall. Leaves 35 x 0.5 cm, linear. Panicle loose, open, 35 - 40 cm long; spikelets purplish to straw; glume: lower lanceolate, 8-15 mm long, scabrulous on the keel; upper 10-15 mm long, bifid at the apex, awn upto 5 mm long,

smooth on the keel. Lemma 8-15 mm, terete, convolute, smooth, awned without articulation. Callus narrow, oblong.

Specimen studied: Karanjhar hills, 21-3-2005, *Zamarrud,* 649 (KUH)

Throughout Pakistan, Afghanistan, Northwest India and Nepal.

Ecological note: Found on sandy plains and at foot hills.

Flowering period: May-September.

Aristida funiculata Trin. & Rupr. Sp. Gram. Stip. 159. 1842; Chaudhri & Chuttar, Veg. Rang. Fl, 84, 1966; Cope, l. c. 45.

Annual, culms upto 30 cm tall. Leaves 10 x 0.2 cm. Panicle 10 cm long, linear with few flowers; spikelets green with brownish tinge; glumes unequal, lower longer than upper, membranous, both, attenuate.Lemma 4 mm long, cylindrical, scabrid above, articulate apically; callus upto 2 mm long, pungent, conical; column twisted, 4.5 mm long.

Specimen studied: Nagarparkar sandy plains, 14-9- 2003, *Zamarrud* 278(KUH).

Grows in India, Pakistan, Arabia, Middle East and Africa

Ecological note: A common species of cultivated fields, sandy plains and the low hills of Nagarparkar.

Flowering period: June-September

Aristida mutabilis Trin. & Rupr., Sp. Gram. Stip. 150. 1842; Chaudhri & Chuttar, l. c. 84; Cope, l. c., 47.

Annual with loose tuft; culms upto 70 cm tall. Leaves narrow, linear, c. 14 cm long. Panicle loose or contracted, upto 20 cm long, narrow, ovate;spikelets grey or pallid; glumes lanceolate, vary in size, scabrulous on the keel .Lemma terete, 4-5 mm long, scabrid at the apex;callus 1-1.5 mm long, linear. Palea shorter than lemma.

Specimen studied: Nagarparkar sandy plains, 21-3-2005, *Zamarrud* 651(KUH).

Distribution found in India, Pakistan, Mauritania and tropical East Africa.

Ecological note: Species grows commonly on the hills and the plains with other annuals.

Flowering period: June-September

BRACHIARIA

(Trin.) Griseb. in Ledeb., Fl. Ross. 4: 469. 1853; Cope, l. c. 201.

Annual to perennial, grasses with linear leaves. Inflorescence composed of racemes with a common axis; rachis 3-angled to ribbon-like with a single spikelet or occasionally in pairs; spikelets ovate to oblong, lower glume much shorter than the upper glume which is as long as spikelet; lower floret male or sterile with its lemma similar to upper glume; upper lemma obtuse or acute, coriacious, its margins covering the edges of palea. Caryopsis elliptic, compressed dorsally.

A genus with c.100 species, distributed in warm regions, mainly in Africa.

Brachiaria ramosa (L.) Stapf in Prain, Fl. Trop. Afr. 9: 542. 1919; Chaudhri & Chuttar, l. c. 85; Cope, l. c. 207.

Panicum ramosum L., Mant. 1: 29. 1767.

Loosely tufted, annual, c. 70 cm tall. Leaf-blades lanceolate, 2-2.5 x 0.4-1.4 cm. Raceme 1-8 cm long, simple or branched at the base, mostly paired with loose, contiguous spikelets. Spikelets 2.5-3.5 mm, elliptic, glabrous or pubescent, acute to cuspidate with or without a stipe, 0.5 mm long; glume shorter than spikelets, upper glume and lower lemma membranous, upper lemma rugose, subacute-acute.

Specimen studied: Nagarparkar near cultivated fields, 24-9-2005, *Zamarrud & Alam* 829(KUH).

Grows in Asia and Africa.

Ecological note: Fairly common species of sandy plains and the slopes .

Flowering period: August-September

CENCHRUS

L., Sp. Pl. 2: 1049. 1753; Gen. Pl. 5.: 470. 1754; Cope l.c. 240.

Annual to perennial with flat or involute leaves and with a ligule reduced to a line of hairs. Inflorescence a cylindrical, spicate panicle with an angular rachis. Each spikelet or cluster of spikelets enclosed by involucre which is composed of 1 or more whorls of bristles, these are often spiny and connate at the base. Spikelets lanceolate to ovate; lower glume half the length of spikelet, upper glume longer than the lower; lower floret male or

sterile with its lemma equaling the length of spikelet; upper lemma as long as the spikelet. Caryopsis elliptic to ovoid, dorsally compressed.

The genus consists of c.22 species, distributed in warm and temperate regions, especially in Asia and Africa.

KEY TO THE SPECIES

1+	One of the inner bristles longer and tougher than the others.....2
-	All bristles similar of ± equal length.....4
2+	Bristles retrosely scabrulous, pungent above.....*C. biflorous*
-	Bristles antrorsely scabrulous, not pungent.....3
3+	Bristles plumose, 10-20 mm long, densely ciliate below on the margin.....*C. prieurii*
-	Bristles 2-4 mm long, usually glabrous on the margin.....*C. setigerous*
4+	Inner bristles connate at the base forming a rim , up to 0.5 mm long above the rim.....*C. ciliaris*
-	Inner bristles connate for 1-2.5 mm above the rim of the basal disc.....*C. pennisetiformis*

Cenchrus biflorus Roxb., Fl. Ind. I. 238. 1820; Cope, l. c. 243.

Annual; culms upto 90 cm tall. Leaves 2-25 x 0.2-0.7 cm. Panicles 2-15 cm long; rigidly bristles rigid; involucre 4-11 mm long, ovoid inner bristles apically flat, base connate, forming an angular disc of c. 4 mm in diameter, outer surface containing grooves, hairy apex pungent or prickly, basally ciliate; outer bristles numerous, shorter than the inner. Spikelets 1-3 per burr.

Specimen studied: Nagarparkar hills, 16-9-1968, *Ali,* 1516 (KUH). Budhaser, 20-3-2003, *Zamarrud* & *Alam*266 (KUH).

Grows widely in India, Pakistan, Arabia and Tropical Africa.

Ecological note: Common species in the plains of Nagarparkar.

Flowering period: Jan-April, September-November.

Cenchrus ciliaris L., Mant. 2: 302. 1771; Cope, l. c. 241

Perennial, culms upto 150 cm tall, often suffruticose, ascending. Leaves 3-25 x 0.2-1 cm. Panicles 2-12 cm long, cylindrical-ovoid, purple or straw coloured; rachis puberulous, angular involucre 6-16 mm, elongated. Inner bristles equall to the spikelets, outer bristles filiform. Spikelets 2-4 per burr, 2-5.5 mm long acutely lanceolate; glume distinct, acute, equaling the spikelet.

Specimen studied: Nagarparkar town near cultivated fields, 25-9-2005, *Zamarrud & Alam* 856 (KUH).

Widely grows in the Old World.

Ecological note: Grows abundantly on sandy plains with *Convolvulus prostratus*, *Cucurbitacious* spp. and large shrubs and trees such as *Euphorbia caducifolia* and *Acacia nilotica*, rare on the hills.

Flowering period: February-March, September-October

Cenchrus pennisetiformis Hochst. & Steud. ex Steud., Syn. Pl. Glum. 1: 109. 1854; Cope, l. c. 242.

Annual or perennial; culms erect 10-40 cm tall.Leafblades 2-20 cm x 2-5 mm, flat or involute. Panicle 2-6 cm long, inner bristles connate for 1-2.5 mm above the rim of the basal disc to form a cup, involucre elongate, 6-16 mm long; spikelets 1-3 per burr, 3-5 mm long.

specimen studied: Kasbo, near Nagarparkar town, 19-9 2004, *Zamarrud & Alam* 576 (KUH).

It is found in India Pakistan, Arabia and tropical East Africa. Introduced in Australia

Ecological note: Common species of the sandy plains but rare on the hills.

Flowering period: February-October, August-October

Cenchrus prieurii (Kunth) Maire in Bull. Mus. Hist. Paris, ser. 2, 3: 523. 1931; Cope, l. c. 244.

Pennisetum prieurii Kunth, Rev. Gram.2:411, t. 119. 1831

Annual with 35 cm tall culms. Leaves 5-7 x 0.35-0.5 cm. Panicle 5-9 cm long cylindrical, rachis loose, scabrid; involucre elongate, 15-27 mm long, inner spine, flat, outer surface densely ciliate with one or two shallow grooves or plumose, connate below, filiform above. Spikelets 4.3 mm long, lanceolate, 1 or 2 per burr.

Specimen studied: Kasbo, near Nagarparkar town, 19-9- 2004, *Zamarrud & Alam* 577(KUH).

Found in India, Pakistan, Arabia and northern Africa.

Ecological note: Common on sandy plains and sporadic at the foot hills.

Flowering period: March-September

Cenchrus setigerus Vahl, Enum. Pl. 2: 395. 1806; Cope, l. c. 245. f. 24. 5-6.

Perennial, forming clumps from bulbiferous base, culms erect, upto 80 cm tall, geniculately ascending. Leaves 2-20 cm x 2-7 mm. Panicle upto 12 cm long; involucre 3-7 mm, cup shaped; inner bristles numerous, shorter than outer, scabrulous, margin ciliate, spikelets 3-5 mm , 1-3 per burr.

specimen studied: Nagarparkar sandy plains, 19-9- 2004, *Zamarrud & Alam* 601 (KUH).

Found in India, Pakistan, Arabia and tropical Africa

Ecological note: Common species of sandy plains.

Flowering period: March-September

CHLORIS

Swartz. Prod. Veg. ind. Occ. 25. 1788; Cope, l. c. 118.

Annual to perennial, tufted, rhizomatous or stoloniferous with linear, flat or folded leaves and membranous ligule. Inflorescence 4-20, digitately arranged spikes. Spikelets 2-4(-6) flowered, sessile or pedicellate arranged in 2-rows; usually only the lowest fertile; glumes unequal, hyaline, midrib green and tough; lower lemma coriaceous, entire or 2-lobed above, all or some awned, awns equal to or much longer than the spikelet; paleas usually absent. Caryopsis ellipsoid to linear, usually trigonous or dorsally compressed.

The genus is composed of c.40 species, distributed in warm temperate and tropical regions of the world.

Chloris barbata Sw., Fl. Ind. Occ. I: 200. 1797; Chaudhri & Chuttar, l. c. 86; Cope, l. c. 121.

Loosely tufted, perennial; culm upto 1m tall, glabrous,stoloniferous. Leaves rarely involute 40 x 0.3 cm, folded toward apex. spikelets 4-8 cm, each with 3-flowers, glumes unequal. Second lemma small, clavate, glabrous, awned, scaly, third lemma similar to second but smaller. Callus rounded , ciliate.

Specimen studied: Nagarparkar town near high school, 19-9-2003, *Zamarrud & Sarwar*303 (KUH).

Widely distributed throughout the tropics and Sindh in Pakistan.

Ecological note: Common throughout the area especially in moist places.

Flowering period: Round the year.

CYMBOPOGON

Spreng., Pl. Pungill. 2: 14. 1815; Cope, l. c. 326.

Tall, densely tufted, perennial herbs. Leaves linear, often aromatic. Ligule membranous or scarious. Inflorescense a pair of racemes included in an inflated boat-shaped spatheole. Racemes divaricate, sessile and pedicellate spikelets of lower pair similar but male or neuter; bisexual spikelets dorsally compressed, awned, 2-flowered. The upper perfect, lower reduced to lemma; glumes equal or so. Caryopsis ± oblong.

The genus consists of c. 40 species, distributed in the tropics and subtropics of the Old World.

KEY TO THE SPECIES

1+	Culms up to 3 m high with short woody root stock. Sessile spikelet elliptic-oblong.....*C. martinii*
-	Culms up to 1.5 m high, woody root stock absent. Sessile spikelet lanceolate to narrowly lanceolate.....2
2+	Rachis internode and pedicles densely hairy on the back. Lower raceme not swollen and barrel- shaped ; upper lemma deeply bifid with 7-10 mm long awn.....*C.jawrancusa*
-	Rachis internode and pedicles glabrous or minutely hairy on the back. Lower raceme swollen and barrel- shaped; upper lemma deeply bifid with 10-20 mm long awn.....*C.commutatus*

Cymbopogon commutatus (Steud.) Stapf in Kew Bull. 1907: 211. 1907; Cope, l. c. 330.

Andropogan commutatus Steud., Syn . Pl. Glum. 1: 387. 1854.

Perennial, culms erect or ascending, upto 150 cm tall. Leaves 10-50 x 0.1-0.4 cm, reddish or dull green, narrow at the base, filiform above . Racemes 15-40 mm long; pedunculate, lower raceme swollen and barrel- shaped. Internodes and pedicles densely hairy along the margin, glabrous to shortly hairy on the back. Spikelets 4-7 mm long, lower glume somewhat flat to deeply concave on the back; upper lemma deeply bifid with 1-2 cm long awns.

Specimen studied: Nagarparkar hills , *Qaiser, Ghafoor & Abrar Hussain* 4049 (KUH); Nagarparkar hills, 19-9- 2004, *Zamarrud & Alam* 606 (KUH).

Grows in Mauritania, Eastward to Somalia, Tanzania and throughout gulf area, Pakistan and India.

Ecological note: Grows in rocks crevices on the hills.

Flowering period: April-October

Cymbopogon martinii (Roxb.) Wats. in Atkins., Gaz. NW. India 10: 392. 1882; Cope, l. c. 332.

Andropogon martinii Roxb . Fl. Ind. 1: 280. 1820.

Robust, perennial, upto 3 m tall. Leaves 50 x 1-3 cm, linear-lanceolate, glucous or pruinose below, cordate or amplexicaul base , apex tapering- filiform. Inflorescence pseudopanicle 30 cm long, linear- oblong, reddish. Raceme 15-20 mm long; pedunculate, lowest pedicel swollen; internode ciliate, margin pilose hairy; spikelets sessile, elliptic or oblong. Lower glume with a deep groove in the lower part; upper lemma bifid with 12-18 mm long awns.

Specimen studied: Karanjhar hills Nagarparkar, *Qaiser, Ghafoor & Abrar Hussain* 4050 (KUH); Hills, 19-9- 2004, *Zamarrud & Alam* 608 (KUH); Nagarparkar hills, 19-9- 2005, *Zamarrud & Alam* 819 (KUH).

Grows in Pakistan and India, cutivated in tropics.

Ecological note: Common species of the hills .

Flowering period: September-November

Cymbopogon jwarancusa (Jones) Schult. Syst. Veg. 2, Mant. 458. 1824; Cope, l. c. 328.

Andropogan jwarancusa Jones in Asiat. Res . 4: 109. 1795.

Perennial, upto 1.5 m tall. Leaves 30 x 0.5 cm, flat or coiled, glabrous below, attenuate-filiform above, narrow at the base. Raceme 13-22 mm long, lowest pedicels not cylindrical, internode and pedicels densely ciliate along the margin and on the back. Spikelets sessile, lanceolate, 4-5.5 mm long; lower glumes slightly concave, upper lemma deeply bifid with 7-10 mm long awn.

Specimen studied: Nagarparkar, Karanjhar hills, 15-9-2004, *Zamarrud & Alam* 565 (KUH).

Found in Pakistan, India and Nepal

Ecological note: A common species of the slopes.

Flowering period: August-November

CYNODON

Rich. in Pers., Syn. Pl. 1: 85. 1805;Cope , l.c. 116. nom. cons.

Creeping perennials with usually linear and flat leaves and a membranous ligule. Inflorescence of digitate, 1-sided spikes; spikes 2-8; spikelet 1-flowered, laterally compressed, awnless; glumes 2, shorter than the floret, usually 1-nerved; lemma 3-nerved, with ciliate keel, awnless; palea 2-keeled. Caryopsis ellipsoid.

The genus comprises 8 species, distributed in tropical and warm temperate regions.1 species occurs in Nagarparkar.

Cynodon dactylon (L.) Pers., Syn. Pl. 1: 85. 1805; Chaudhri & Chuttar, l. c. 87; Cope, l. c. 117.

Panicum dactylon L., Sp. Pl. 1: 58. 1753.

Stoloniferous, perennial herb; culms upto 40 cm long. Leaves 2-12 x 0.2-0.4 cm, small auricles, usually bearded , ligule 0.3 mm long ,short scarious, rim ciliolate. Raceme usually 4-6, upto 7 cm long. Spikelets 2-3 mm long; glumes lanceolate. Lemma not clavate; palea glabrous, scabrulous on the keels. Caryopsis usually turgid.

Specimen studied: Budhaser near Nagarparkar, 23-3-2005, *Zamarrud* 689(KUH).

Widely grows in tropical and warm temperate regions throughout the world

Ecological note: A lawn grass, rarely found in sandy plains.

Flowering period: All year round.

DACTYLOCTENIUM

Willd., Enum. Hort. Berol. 1029. 1809; Cope, l. c. 105.

Stoloniferous, annual to perennial, tufted grasses with linear leaves and membranous ligules. Inflorescence digitate, terminal with 2-several, sessile; rachilla disarticulate above the first glume and between the florets; glumes ± unequal, 1-nerved, keeled, shorter than the lemmas; lemmas 3-nerved, keeled, membranous; palea equal to the length of lemma, 2-keeled. Caryopsis angular.

The genus comprises c.13 species, distributed in warm regions, mainly Africa to Pakistan and India. 2 species are found in our area.

KEY TO THE SPECIES

1+	Annual or perennial with tufed culm. Lemmas ovate.....*D. aegyptium*
-	Perennials without tufted culm.Lemmas lanceolate..... *D.sindicum*

Dactyloctenium aegyptium (L.) Willd., Enum. Hort. Berol. 1029. 1809; Chaudhri & Chuttar, l. c. 87; Cope, l. c. 106.

Cynosurus aegyptius L., Sp. Pl. 1: 72. 1753

Stoloniferous, tufted, annual or perennial, usually mat forming, rarely erect. Leaves 3-25 x 0.2-0.8 mm, margins papillose-hispid. Inflorscence composed of 3-9 spikes, open, spikes 1.2-6.5 cm long, linear-narrowly oblong, ascending or radiating from the clums tip. Spikelets 3-4 flowered, 3-4.5 mm long, ovate; glumes subequal, upper elliptic to narrowly obovate with scabrid awn, lower lanceolate with thick keel. Lemmas ovate, 2.6-4 mm long with acute cuspidate or mucronate keel upto 1mm long, palea winged or wing less; Caryopsis c. 1 mm long, rugose.

Specimen studied: Nagarparkar near dry stream, 16-9-68, *Ali* 1504. (KUH); Nagarparkar near cultivated fields 24-9-2005, *Zamarrud & Alam,* 910 (KUH).

Widely distributed throughout the tropics of the Old World, introduced in America.

Ecological note: Grows in the plains near dry stream beds.

Flowering period: July-October

Dactyloctenium sindicum Boiss., Diagn. ser. 2, 4: 131. 1851;Cope, l.c. 108.

Stoloniferous perennials. Culms upto 45 cm high, slender, swollen at the base. Leaf - blade flat or loosely folded, 1-11x 0.15-0.3 cm, hairy along the margin. Inflorescence composed of 3-5, falcate, oblong spikes, 0.8-2 cm long. Spikelets 3-9 flowered, broadly lanceolate – ovate, 4 - 8 mm long; glumes elliptic, lower 1.7- 2.5 mm long; keel narrowly winged; upper 1.5 – 2.3 mm long; lemmas lanceolate, 3 – 3.8 mm long, obtuse – acute; palea scabrid, wingless. Caryopsis transversely compressed.

Found in India, Pakistan to N. Africa.

Specimen studied: Nagarparkar, plains on way to Wirawa, 1971, *Qaiser, Ghafoor & Abrar Hussain* 4139 (KUH); Nagarparkar, Budhesar, 26-9-2005, *Zamarrud* 918(KUH)

Flowering period: September – May.

Ecological note: Grows in the plains.

DESMOSTACHYA

Stapf in Thieslt. Dyer. Fl. Cap. 7; 632. 1900; Cope, l. c. 109.

A monotyic genus mainly distributed in the Old World tropics.

Desmostachya bipinnata (L.) Stapf in Thieslt. Dyer. Fl. Cap. 7; 632. 1900; Chaudhri & Chuttar, l. c. 88; Cope, l. c. 109. f. 12. 1-9.

Briza bipinnata L., Syst. Nat., ed. 10, 2: 875. 1959.

Perennial with rhizomatous rootstocks. Culms 1.2 m tall, stout. Leaves flat, lower sheaths leathery. Inflorescence spike, clustered, 1-4 cm long, spikelets sessile-subsessile, linear-oblong, with many flowers. Glumes membranous, lanceolate, unequal, single nerved; lemmas keeled, ovate-acute, membranous, glabrous, coriacious, 3-nerved. Palea 2-keeled, shorter than the lemma. Caryopsis obliquely ovoid.

Specimen studied: Nagarparkar, near cultivated fields, 24-9-2005, *Zamarrud & Alam* 912(KUH).

Widely grows in Indo-China, Pakistan, Middle East, and Africa

Ecological note: Common in the plains.

Flowering period: February-September

DICANTHIUM

Willemet in Usteri, Ann. Bot. 18: 11. 1796; Cope, l. c.279.

Annuals or perennials. Leaf-blade planus or rolled, often aromatic; ligule membranous. Infloresence single or subdigitate racemes with or without homogamous spikelets. Spikelets sessile or pedicelate.Internode and pedicels linear, solid. Sessile spikelets dorsally compressed; callus short; lower glumes brodly – slightly convex on the back, rounded on the flank. Lower floret reduced to hyline lemma, upper lemma stipitiform, entire or dentate, awned. Pediceled spikelet similar to sessile spikelets. Caryopsis oblong.

A genus of c.20 species, distributed in the tropical regions of the Old world. 2 species grows in our region.

KEY TO THE SPECIES

1+	Infloresence enclosed within spatheole.Spikelets narrowly elliptic..... ....*D. annulatum*
-	Inflorescence open. Spikelets narrowly Oblong.....*D. foveolatum*

Dichanthium annulatum (Forssk.) Stapf in Prain, Fl. Trop. Afr. 9: 178. 1917. Cope, l. c. 280.

Andropogon annulatum Forssk., Fl. Aegypt.- Arab. 173.

Perennials, upto 100 cm, high. Leaf – blades 3-30 x 0.2 - 0.7 cm. Inflorescence ± digitate, short peduncled, racemes; peduncled glabrous; racemes 3-7 cm long, spikelets subimbricate; internode and pedicels solid. Sessile spikelets: narrowly oblong, 2-6 mm long; lower glume cartilaginous, slightly concave, hairy, obtuse – subacute; awn 8-25 mm long.

Specimen studied: Nagarparkar, Budhesar, *Qaiser & Ghafoor & Abrar Hussain* 4110 (KUH); Nagarparkar, Budhesar,26-9-2005, *Zamarrud*.936(KUH).

Pakistan, Iran, Iraq, Kuwat, Arabia, Kenya, Tanzania to Indonesia. Introduced in South Africa and Australia.

Ecological note: A common species of the area.

Flowering period: Almost round the year

Dichanthium foveolatum (Del.,) Roberty in Boissiera, 9: 170. 1960; Cope, l.c. 279.

Andropogon foveolatus Del., Fl. Egypt, 16. t. 8/2.1812.

Perennial with tufted base, basal leaves silky. Culms upto 80 cm high. Leaf- blades 1-15 x 0.1- 0.3 cm, flat sometimes rolled. Inflorescence a solitary raceme enveloped by spatheole, raceme 1-4.5 cm long; homogamous spikelets absent or sometimes present at the base. Sessile spikelets narrowly elliptic, 2.5 – 4 mm long; lower glume cartilaginous, glabrous; upper lemma entire or minutely dentate, awn 12-18 mm long. Pedicelled spikelets with or without pit.

Specimen studied: Nagarparkar, Budhesar, *Qaiser, Ghafoor & Abrar Hussain* 4155(KUH); Nagarparkar, Budhesar,26-9-2005, *Zamarrud* 927(KUH).

Pakistan, Middle east, Somalia,Kenya, Mali and India to Srilanka.

Ecological note: A common species of the plains.

Flowering period: March - September

DIGITARIA

Haller, Hist. Stirp. 2:244. 1768; Cope, l.c. 216.

Annuals or perennials. Leaf-blades linear, flat. Ligule short, scarious or membranous, glabrous or ciliate. Inflorescence composed of racemes, digitate or born on an central axis, rarely solitary; rachis flat or triquetrous;

spikelets 1-5 or more; lower glumes abaxil.Rachis smooth or scaberulous; spikelets lanceolate to elliptic – oblong; upper glumes membranous, equal to

spikelets or shorter than lemma, lower glumes small. Caryopsis oblong.

A genus of c. 200 species, commonly grows in tropical and warm temperate region in the Old world. One species grows in Nagarparkar.

Digitaria ciliaris (Retz.) Koel, Descr. Gram. 27. 1802; Cope, l.c.228

Annual with decumbent based culm, ascending upto 100 cm high. Leaf-blades broadly linear, 3-25 x 0.3 – 1cm. Inflorescence digitate or subdigitate, composed of 2-12, racemes; stiff, 6 -22 cm long. Rachis triquetrous; pedicel tiquetrous, scabrid. Spikelets narrowly elliptic, upto 37 mm; lower glume triangular shorter than upper glume, upper glume half the length of spikelets, 3-nerved; lemmas as long as the spikelets, 7-nerved.Caryopsis ellipsoid, grey to brown.

Specimen studied:Nagarparkar, *Qaiser, Ghafoor & Abrar Hussain* 4000(KUH);Nagarparkar near cultivated field, 26-9-2005, *Zamarrud* 939(KUH).

Pakistan, India, Srilanka and Myanmar

Ecological note: Common species of the plains.

Flowering period: July-october

ERAGROSTIS

L., Sp. Pl. 1: 61. 1753; Gen. Pl.5.36.1754; Cope, l. c. 472.

Annual to perennial with linear leaves. Inflorescence a much divided panicle or rarely spike-like, usually glandular. Leaf-blades linear; ligule usually reduced to ciliate rim, rarely membranous. Spikelets 2- many flowered, small, often gaping with the prolonged rachilla; glumes shorter than the lemma, 1-nerved; lemmas 3-nerved; palea usually shorter than lemma.

A genus of c. 220 species, distributed in temperate and cold regions, mainly in N. hemisphere.

Eragrostis cilianensis (All.) Vig.-Lutati. in Malpighia 18: 386. 1904; Cope, l. c. 93.

Poa cilianesis All., Fl. Pedam. 2: 246. t. 91/2. 1785.

Loosely tufted, annual, culms erect, 10- 90 cm tall. Leaves 15 x 0.8 cm, flat, glabrous, margins with warty glands. Panicles 4-30 cm long, branched, glandular; spikelets 5-60 flowered, linear 3-20 x 2-4 mm or laterally compressed, pallid, yellowish-green. Glume early fallen, navicular, 1.5-2.2 mm long, nerved, sometimes with glandular keel. Lemmas broadly ovate, 1.7-2.8 mm, with glandular keel. Anthers 3, minute, Caryopsis subglobose, rarely oblong, dark reddish brown, 0.5-0.7 mm long.

Specimen studied: Nagarparkar sandy plains, 19-9-2003, *Zamarrud & Sarwar* 427 (KUH).

Tropical and warm temperate regions of the Old World, introduced to the New World.

Ecological note: Common species of the desert.

Flowering period: March-November

OCHTHOCHLOA

Edgew. in J. Asiat. Soc. Beng. 11: 26.1842; Cope, l.c. 81.

Tufted, perennials with stoloniferous underground parts and folded leaf- blades. Ligule a short membranous with ciliate fringe. Inflorescence composed of 2-5 short twisted, leaf like, deciduous racemes. Spikelets several flowered, ovate- elliptic. Glumes shorter than the lemmas. Upper glumes and lemmas 3-nerved, keeled, lemmas elliptic-lanceolate, acute or short awned. Caryopsis enclosed within a hyline pericarp.

A monotypic genus grows India, Pakistan, Arabia to N.Africa. Species also found in our region.

Ochthochloa compressa (Forssk.)Hilu in Kew Bull.36: 000. 1981. Cope, l.c. 81.

Panicum compressa Forssk., Fl. Aegypt-Arab. 18. 1775.

Stoloniferous perennials with culms, prostrate to ascending upto 30 cm high, rarely upto 90 cm high.Leaf- blades 1-15 x 0.2- 0.3 cm. Inflorescence upto 4.5 cm long, terminal, spikes. Spikelets 4-8 flowered, upto 8 mm long; lower glume 2.2 – 2.7 mm long; upper 3.5 – 4.7 mm long; lemmas 3.8- 5.4 mm long.

Specimen studied:Tharparkar, 3 miles from Naokot on way to diplo, *Qaiser, Ghafoor & Abrar Hussain*, 3646(KUH);Nagarparkar, 26-9-2005, *Zamarrud* 935(KUH).

India, Pakistan to N. Africa.

Ecological note: Grows in the plains.

Flowering period: March- September

PANICUM

L., Sp. 1: 55. 1753;Gen. Pl. 5.36.1754 ; Cope , l.c. 161.

Annual to perennial grasses with linear to ovate, rolled or flat leaves and a ciliate rim ligule. Inflorescence a much branched panicle. Spikelets usually ovate to elliptic, with 1 bisexual flower only, long pedicellate; glumes unequal, the lower shorter, 5-many nerved; lower floret male or sterile, its lemma similar to upper glume; upper lemma equaling to spikelet. Caryopsis ellipsoid.

A large genus with c.600 species in tropical and warm temperate regions of both the Worlds.

KEY TO THE SPECIES

1+	Spikelets elliptic; glumes with hyaline margin.....*P. antidotale*
-	Spikelets ovoid; glumes without hyaline margin....*P. turgidum*

Panicum antidotale Retz., Obs. Bot. 4: 17. 1786; Cope, l. c.171.

Perennial herb with branched ,woody culms, ascending upto 180 cm high. Leaf –blades linear, 6-30 x 0.2.-1.4 cm, flat, glabrous, pointed. Inflorescence a panicle; narrowly pyramidal to broadly oblong or ovate, 13-32 cm long. Spikelets elliptic, 2.4- 3.6 mm

long, glabrous, acute; lower glume broadly ovate, membranous with hyaline margin, shorter than the spikelets, 3-5 nerved, acute; upper glume with broad hyaline margins, 7-9 nerved, rarely 11-nerved; lower lemma 7-9 nerved; palea equal to the lemma; upper lemma pallid and smooth.

Specimen studied: Nagarparkar, hills, *Qaiser, Ghafoor & Abrar Hussain* 4072(KUH);Nagarparkar, Karanjhar hills, 24-9-2005, *Zamarrud* 924(KUH); Tropical Africa, Arabia, Iran, Afghanistan, Pakistan and India.

Ecological notes: Common species of the hills and plains.

Flowering period: March- October

Panicum turgidum Forssk., Fl. Aegypt-Arab.18. 1775; Chaudhri & Chuttar, l. c. 95; Cope, l. c. 167. f. 17. 1-11.

Perennial herb, 0.4-1(2) m tall, glucous, culms ascending, dichotomously branched. Leaves 0.5-15 cm x 0.1-0.6 cm, glabrous, linear-lanceolate, flat, convolute, stiffy and pungent, rarely upto 30 cm long. Panicle usually much branched, distinct; spiculate to the base, glabrous, 3-15 cm, rarely upto 30 cm long.Spikelets ovoid; glumes as long as the spikelets; lower glumes ovate, 5-9 nerved, upper 7-9 nerved; lower lemma, pallid, smooth and shining.

Specimen studied: Budhasar, 14-3-2003, *Zamarrud* 213 (KUH); 21-3-2005, *Zamarrud & Alam*815(KUH); Nagarparkar near cultivated fields, 24-9-2005, *Zamarrud & Alam* 909(KUH); Kasbo, 24-9-2005, *Zamarrud* 911(KUH).

Widely growing species of Asia and Africa

Ecological note: Frequently found in the plains and the hills.

Flowering period: February-September

PENNISETUM

Rich. in Pers., Syn. Pl. 1: 72. 1805; Cope, l. c. 232.

Annual to perennial grasses with linear to lanceolate, flat or convolute leaves and ligule a line to hairs. Inflorescence a cylindrical to globose spike-like panicle; spikelets narrowly lanceolate to oblong, subtended by a deciduous involucre of 1-many, free bristles, rachis cylindrical or angular, lower glume shorter than spikelet; lower floret male or sterile, its lemma of various lengths. Caryopsis oblong.

Genus consists of c.130 species, distributed in the tropics and subtropics of the World. Represented by the following species in our area.

Pennisetum divisum (Gmel.) Henr. in Blumea 3: 162. 1938; Chaudhri & Chuttar, l. c. 97; Cope, l. c. 239.

Panicum divisum Gmel., Syst. Nat. 2:156. 1791.

Perennial, culms rhizomatous, erect, upto 1 m tall with woody branches.Leaf-blades upto 15 ċm long, sometimes shorter than sheath. Panicles 5-12 cm long, oblong; rachis with shallow angular ribs below the cupular scars, scabrulous. Spikelets, narrowly lanceolate, 6.5-8.5 mm long. Lower glumes shorter than spikelets, acute-accuminate with 1-3 nerves, upper glumes equaling the spikelets, acute-accuminate. Lemmas lanceolate-accuminate.

Specimen studied: Nagarparkar, 20-9-2004, *Zamarrud* 481(KUH).

Nagarparkar near cultivated fields 24-9-2005, *Zamarrud & Alam* 914(KUH).

Asia and North Africa.

Ecological note: Cultivated throughout the area, also grows as an escape.

Flowering period: October-November.

SACCHARUM

L., Sp. Pl. 1: 54. 1753; Gen. Pl. 5:28. 1754; Cope, l. c. 259.

Tall perennial with solid culms. Leaves linear to lanceolate.Ligule scarious or a line of hairs. Inflorescence terminal, large, often silvery, plumose, racemes, crowded upon the primary panicle; spikelets all alike in pairs, one sessile, the other pedicellate; upper floret bisexual with usually awnless, lanceolate, hyaline lemma, palea small; lower floret reduced to lemma.

The genus comprises 35-40 species, distributed in the tropics of both the Worlds.

Saccharum bengalense Retz.,Obs. Bot. 5: 16. 1789; Cope, l.c. 264.

Culms upto 4 m tall. Leaves flat or channeled, 90 x 0.3-1cm, glaucous. Panicle 20-75 cm long, peduncled, glabrous, supporting branches longer than the inflorscence. Branches and pedicel hirsute, upto 7 mm long; spikelets 3.8-5.5 mm long, ± hetromorphous; lower glume hairy on the back present at sessile spikelets, upper glume glabrous, glumes of pedicelled spikelets hairy. Lower lemma oblong-elliptic, upper lemma ovate-lanceolate, margin ciliate, acute or shortly awned.

Specimen studied: Nagarparkar, near cultivated fields, 24-9-2005, *Zamarrud & Alam* 888(KUH).

India and Pakistan.

Ecological note: Grows in marshy places formig almost a pure colony.

Flowering period: February-September

SETARIA

P. Beaurt. Essai Agrost. 51. 1812; Cope, l. c. 177.

Annual to perennial grasses with flat or folded or sometimes falcate leaves, ligule usually a ciliate rim. Inflorescence open or spiciform panicles; spikelets awnless, subtended by 1-many bristles, ovate from a clasping base, upper equal to or shorter than spikelet; lower floret male or sterile. Caryopsis oblong to ellipsoid.

The genus consisting of c.150 species, distributed in the tropical and subtropical regions.

KEY TO THE SPECIES

1+	Panicle spiciform, lower glume 3-times shorter than spikelet... ...*S. pumila*
-	Panicle linear lower glume not 3-times shorter than spikelet....*S. verticillata*

Setaria pumila (Poir.) Roem.& Schult. Syst. Veg. 2: 891. 1817; Cope, l. c. 181.

Panicum pumilum Poir., Encycl. Meth. Bot., Suppl. 4. 273. 1816.

Annual, loosely tufted, culms, erect upto 100 cm or more tall. Leaves 3-30 x 0.2-1.6 cm, broadly linear, glabrous or loosely pilose, sheath glabrous to pubescent. Panicle linear, lax, 2-15 cm long, elongated, bristles, 3-8 mm long; spikelets ellipsoid, 1.5-3.5 mm long, lower glume 3-times shorter than spikelet; upper glume equal to spikelets; palea minute, lemma rugose.

Specimen studied: Nagarparkar sandy desert, 19-9-2003, *Zamarrud & Sarwar* 312 (KUH).

Generally grows in tropical and warm temperate regions.

Ecological note: Found in the sandy plains.

Flowering period: February-Semtember.

Setaria verticillata (L.) P. Beauv., Ess. Agrost. 51. 178.1812; Cope,l.c. 179.

Panicum verticillatum L. Sp. Pl., ed. 2. 1: 82. 1762.

Loosly tufted, annual with upto 100 cm long culm. Leaf-blades brodly linear, 5-30 x 0.4-1.6 cm, flaccid, glabrous to hairy. Panicle spiciform, linear – untidly lobed, 2-15 cm long. Spikelets ellipsoid, 1.5 – 2.5 mm long; lower glumes smaller than the spikelets; upper glumes equal to the spikelets; lower florets sterile; palea minute; upper lemma rugose.

A common species of tropical and warm temperate regions.

Specimen studied:Nagarparkar, Budhasar, 1971, *Qaiser, Ghafoor & Abrar Hussain* 4098 (KUH); Nagarparkar, Kasbo, 26-9-2005, *Zamarrud & Alam* 933 (KUH).

Flowering period: Round the year

Ecological note: Common growing species of the plains.

TETRAPOGON

Desf., F. Atlant. 2: 388. t. 256. 1799 ;Cope, l.c. 127

Annual to perennial, tufted, grasses.Leaves linear, flat or folded with membranous ligule. Inflorescence terminal, solitary or in pair of dense, ciliate or villous spikes. Spikelets 4-9(-12) flowered, glumes persistent, similar, 1-nerved; lemma keeled, cariaceaus; palea ciliate on the keels; upper florets sterile, represented by awned or awnless lemmas. Caryopsis ovate or so.

A small genus comprising of c. 5 species, distributed in the tropics and subtropics of the Old World.

Tetrapogon tenellus (Koen. ex Roxb.) Choiv.in Annuar.R.1st. bot.Roma, 8:352.1908; Cope,l.c. 127.

Chloris tenella Koen. ex Roxb., Fl. Ind. 1:330. 1820.

Loosely tufted, upto 60 cm tall, herb. Leaves 5-20x0.2-0.5 cm, linear, often flabellate at the base of the culm.Spikes 3-7 cm long; spikelets 4-8 flowered, lower floret fertile, awned; glumes ovate-lanceolate, upper longer than inner. Lowest lemma shortly ciliate or subglabrous.

Specimen studied: About 15 miles from Nagarparkar on way to Islamkot, 24-10-70, *Qaiser, Ghafoor & Abrar Hussain* 3942 (KUH) Budhaser near Nagarparkar, 19-3-2005, *Zamarrud* 654 (KUH).

India, Pakistan, tropical Africa to Zimbabwe and Angola.

Flowering period: March-October

Ecological note: A common species of the plains, rarely grows on the hills.

TRAGUS

Haller, Hist. Stirp. Helv.2:203.1768; Cope,l.c.149.

Annuals or perennials with flat leaf-blades, ciliate. Ligule a line of hairs. Inflorescence stiff, dense, cylindrical, spike-like. Spikelets in subsessile, rarely on long peduncled, deciduous clusters; spikelets 2-5 in each cluster; spikelets lanceolate-ovate, awnless, all alike; glumes dissimilar, lower a minute hyaline scale, upper as long as the spikelets; lemmas equal to the length of glumes, ovate, 3-nerved. Caryopsis ellipsoid-oblong.

A genus of c.7 species, distributed in tropics. One is found in our area.

Tragus roxburghii Panigrahi in Kew Bull. 29: 495. 1974; Cope, l.c. 150.

Annual with prostrate base, culms upto 20 long. Leaf-blades 5-50 x 1-4 mm. Inflorescence upto 4 cm long, cylindrical of 2 subequal and subopposite spikelets. Spikelets 2-4 mm long; upper glumes 5-nerved.

Pakistan, India , Srilanka, Malaysia and East Africa.

Specimen studied: Nagarparkar, Budhesar, *Qaiser, Ghafoor & Abrar Hussain* 4122 (KUH);Nagarparkar,26-9-2005, Zamarrud 931(KUH).

Flowering period: Round the year.

Ecological note: Grows in the plains.

2.4.7. TYPHACEAE

Monoecious, aquatic or marshy, perennial herbs with submerged scaly creeping rhizomes. Leaves basal or all over the stem. Flowers in terminal cylindrical spike; male above and female below; male flowers with 1-3 stamens, surrounded by 1-more hairs, some representing the perianth. Female flower with 1-carpel; ovary superior, 1-celled, stipitate. Fruit a follicle.

A family of one genus and c.10 species, distributed in both the Worlds.

TYPHA

L., Sp. Pl. 2: 971. 1753; Gen. Pl.5.924.1754; Omer & Hashmi in E.Nasir & Ali, Fl. Pak. 177: 1. 1987.

Characters of the family. Represented by 1 species in our region.

Typha domingensis Perr., Syn. Pl. 2: 532. 1807; Omer & Hashmi, l.c. 5. f. 2 A-E.

Aquatic or marshy, erect, herb, 1.5-3 m tall, covered with scales. Leaves 50- 60 x 1.5-2.5 cm, semicylendric above the sheath. Inflorescence a terminal spike with male flowers above and female flowers below.Male flowers with 3 stamens. Female flowers: bracteate, stipulate. Ovary superior, 1-celled, with linear stigmas, surrounded by hairs representing calyx. Fruit a follicle, dehiscence longitudinally. Seeds sterile.

Spcimen studied: Karanjhar hills, near seasonal lake, 19-9-2004, *Zamarrud* 580(KUH).

Pantropical.

Ecological note: Common in marshy places with grasses and sedges.

Flowering period: June-August

Discussion

A total 217 species belonging 50 families and 151 genera have been collected and identified. 60 more species (Table -6) are reported from Nagarparkar as compared to previous report of Chaudhri & Chuttar (1966).

In addition to this number of correct names have been adopted by the author for the first time (Table-7).

Table-6: List of the species not recorded by Chaudhri & Chuttar (1966) from Tharparkar including Nagarparkar.

1. *Justicia vahlii* Roth
2. *Amaranthus graecizans* L.
3. *Amaranthus spinosus* L.
4. *Pergularia daemia* (Forssk.) Chiov.
5. *Telosma cordata* (Burm.f.) Merrill
6. *Asphodelus tennifolius* Cav.
7. *Coldenia procumbens* L.
8. *Heliotropium currassavicum* L.
9. *Delonix elata*(L.) Gamble
10. *Senna alexanderina* Mill.
11. *Spinacea oleracea* L.
12. *Convolvulus prostratus* Forssk.
13. *Ipomoea cairica* (L.) Sweet
14. *Ipomea eriocarpa* R. Br.
15. *Ipomea nil* (L.) Roth
16. *Ipomea tricolor* Cav.
17. *Seddera latifolia* Hochest & Steud.
18. *Coccinia grandis* (L.) Voigt
19. *Cuscuta reflexa* Roxb.
20. *Acalypha indica* L.
21. *Euphorbia hypericifolia* L.
22. *Euphorbia granulata* Forssk.

23. *Phyllanthus maderaspatensis* L.
24. *Corbichonia decumbens* (Forssk.) Exell
25. *Limeum indicum* Stocks ex T.Anders.
26. *Sesuvium sesuvioides* (Fenzl) Verdc.
27. *Trianthema triquetra* Rottl and Willd.
28. *Zelaya pentendra* (L.) Jeffery
29. *Fumaria indica* (Hausskn.) Pugsley
30. *Abelmoschus esculentus* (L.) Moench
31. *Abutilon fruticosum* Guill. & Perr.
32. *Malvastrum coromendelianum* (L.) Garcke
33. *Azadirechta indica*
34. *Commicarpus boiseri*(Arn.) Bhandari
35. *Cistanche tubulosa* (Schrenk) Hook. f.
36. *Goniogyna hirta* (Willd.) Ali
37. *Medicago sativa* L.
38. *Rhynchosia pulverulenta* Stocks
39. *Rhynchosia schimperi* Hochst ex Boiss.
40. *Sesbania sesban* (L.) Merrill
41. *Tephrosia uniflora* Gillett & Ali
42. *Vigna trilobata* (L.) Verde
43. *Aristida cyanantha* Nees ex Steud.
44. *Cenchrus ciliaris* L.
45. *Cenchrus prieurii* (Kunth) Maire
46. *Cenchrus setigerus* Vahl
47. *Cymbopogon commutatus* (Steud.) Stapf
48. *Eragrostis cilianensis* (All.) Lut.ex F.T. Hubbard
49. *Saccharum bengalense* Retz
50. *Setaria pumila*(Poir.)Roem.& Schult.
51. *Tetrapogon tenellus* (Koen. ex Roxb.) Choiv.
52. *Rumex dentatus* L.
53. *Borreria articularis* (L.f) F.N. Williams

54. *Lycopersicon esculentum* Miller
55. *Withania coagulans* (Stocks) Dunal
56. *Withania sominifera* (L.) Dunal
57. *Tamarix indica* Willd.
58. *Tamarix sarenensis* Qaiser
59. *Tamarix pakitanica* Qaiser
60. *Corchorus trilocularis* L.
61. *Triumfetta pentandra* A.Rich.

Table-7: List of the species with their correct name, adopted in the present work.

1. ***Senna alexanderina*** Mill.

   syn: Cassia senna
2. ***Senna italica*** Mill.

   syn: Cassia italica
3. ***Cordia sinensis*** Lam.

   syn: Cordia ghraf Forsk.
4. ***Oligochaeta ramosa*** (Roxb.) Wagenitz

   syn:Ambarboa ramosa
5. ***Sida tiagii Bhandari***

   syn:Sida pakistanica Abedin
6. ***Launaea procumbens***(Roxb.) Rumayya &Rajgopal

syn: Pretanthes procumbens Roxb.